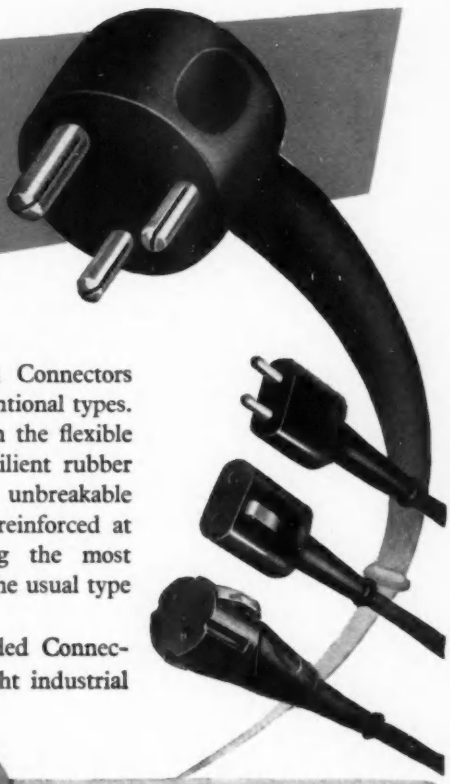
ELECTRICAL TIMES

THURSDAY
25 JUNE
1953
NINEPENCE

You'll never need a TOUGHER CONNECTOR



These BICC Resilient Moulded Connectors give years longer service than the conventional types.

Factory-made connections between the flexible and the contacts are enclosed in a resilient rubber moulding, making the unit virtually unbreakable and shockproof. The flexible lead is reinforced at the point of entry, thus eliminating the most frequent source of failure found with the usual type of detachable plugs and sockets.

There are BICC Resilient Moulded Connectors suitable for domestic, office or light industrial appliances.

Write for Publication No. 305 containing full information.

B.I. Callender's Resilient MOULDED CONNECTOR UNITS

BRITISH INSULATED CALLENDER'S CABLES LIMITED
21, BLOOMSBURY STREET, LONDON, W.C.1

BNE

Immersion Heaters and Circulators

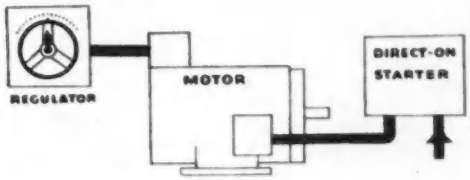
★ Conform to B.S. 1556 ★ Are very easy to install ★ Combine the best features of the old 'Highlow' and 'Charlton' ranges.

A BNE Product

BRITISH NATIONAL ELECTRICS LIMITED

The Domestic Appliances Section of JOHNSON & PHILLIPS LTD.

NEWARTHILL · MOTHERWELL · SCOTLAND



L.S.E. have

BETTER PRODUCTION FOR YOU

IN STOCK

Most machines and processes work best at a particular rate in any given conditions. A few r.p.m. too fast or too slow can make a lot of £ s. d. difference, by affecting quantity and quality of production.

The N-S variable speed a.c. motor gives **exact, stepless control of speed,** by hand or automatically. Thousands are in successful use and **small sizes are available from stock.**

Any L.S.E. Branch will give you full details of the N-S motor. If you do not know the address of your nearest Branch, Norwich will find us.

LAURENCE, SCOTT & ELECTROMOTORS LTD.

Gothic Works, NORWICH, Openshaw, MANCHESTER, and Branches

A

GEO. PIKE LTD.

BIRMINGHAM · PETERBOROUGH
BRISTOL · CARDIFF · GLASGOW
LONDON · SALFORD · STOCKTON

IT IS A "CRESSALL-PRODUCT"

CRESSALL Rheostats incorporate sound electrical and mechanical principles in design—yet prices are competitive.

List No. 80 containing data and prices of our standard sliding Rheostats is both useful and interesting. May we send you a copy?

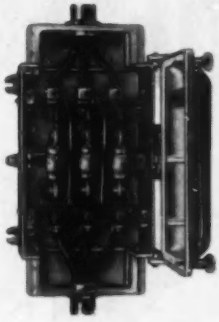
CRESSALL Sliding Rheostat

CRESSALL

Registered Trade Name of

THE CRESSALL MANUFACTURING CO. LTD.
TOWER STREET BIRMINGHAM 19
TELEPHONE: ASTON CROSS 2666 (3 lines)
TELEGRAMS: "OHMIC" BIRMINGHAM

You cannot buy better gear



IMPERIAL FUSE SWITCHES.

35 M.V.A. SHORT CIRCUIT MAKING TESTS

PREVIOUSLY TESTED AT 25 M.V.A., NOW SUCCESSFULLY TESTED AT 35 M.V.A. 440 VOLTS.

SIZES OF 30, 60, 100, 160, 200, 300 AND 500 AMPERES WERE TESTED AND ALL SWITCHES WERE FIT FOR NORMAL USE AFTER TESTS.

ENGLISH ELECTRIC CARTRIDGE FUSE LINKS WERE USED IN THESE FUSE SWITCHES.

FOR DETAILS OF IMPERIAL FUSE SWITCHES SEE PUBLICATION IM153.

BILL SWITCHGEAR LTD.
ASTON LANE · PERRY BARR
BIRMINGHAM·20

more than ever can't beat a "Belling"

for good looks and pleasing lines

for cooking that's sheer perfection

for easiest of easy selling at sensible prices

for the utmost advertising support

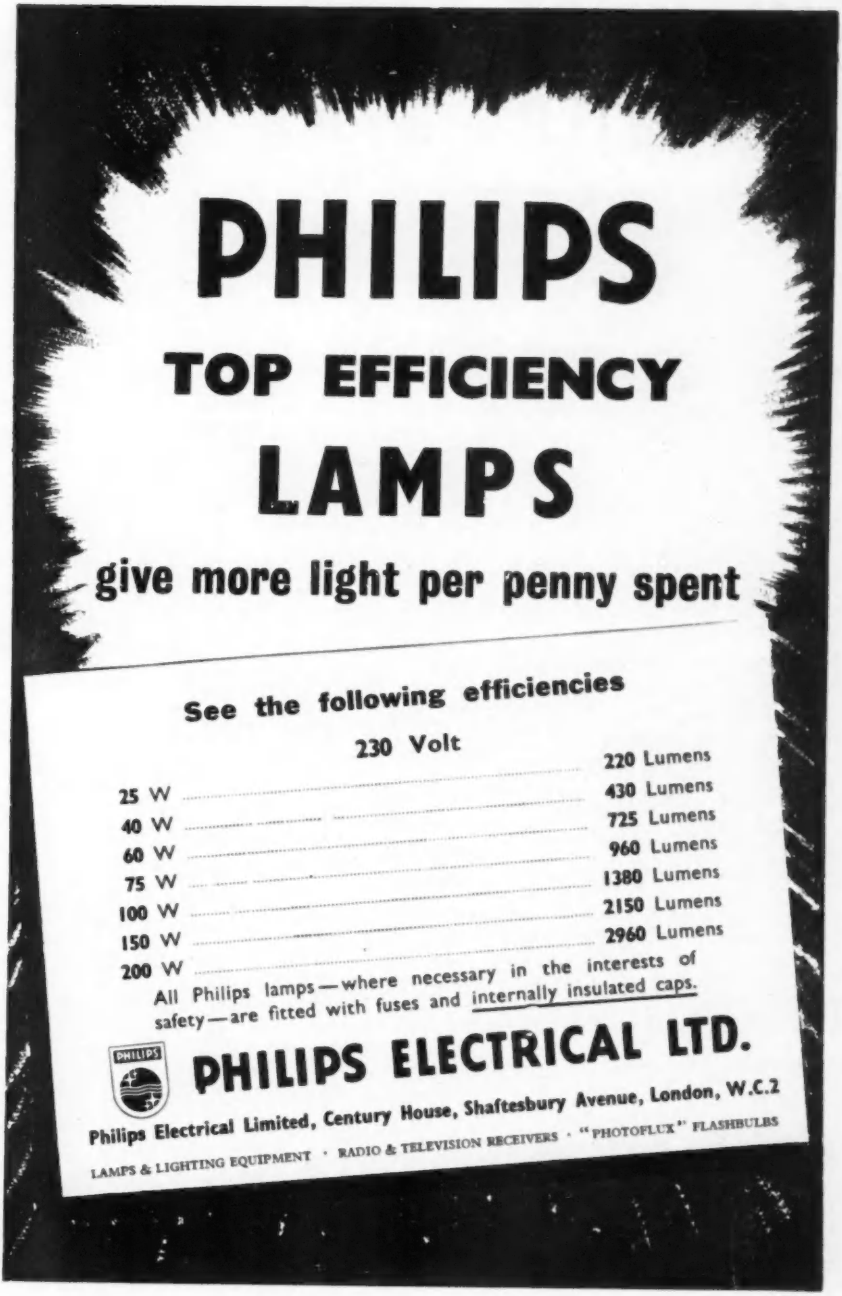
you

for low prices and economical running

for perfect VISIBLE *cooking*

Belling & Co. Ltd. Bridge Works · Enfield · Middlesex · Howard 1212

CRC 399

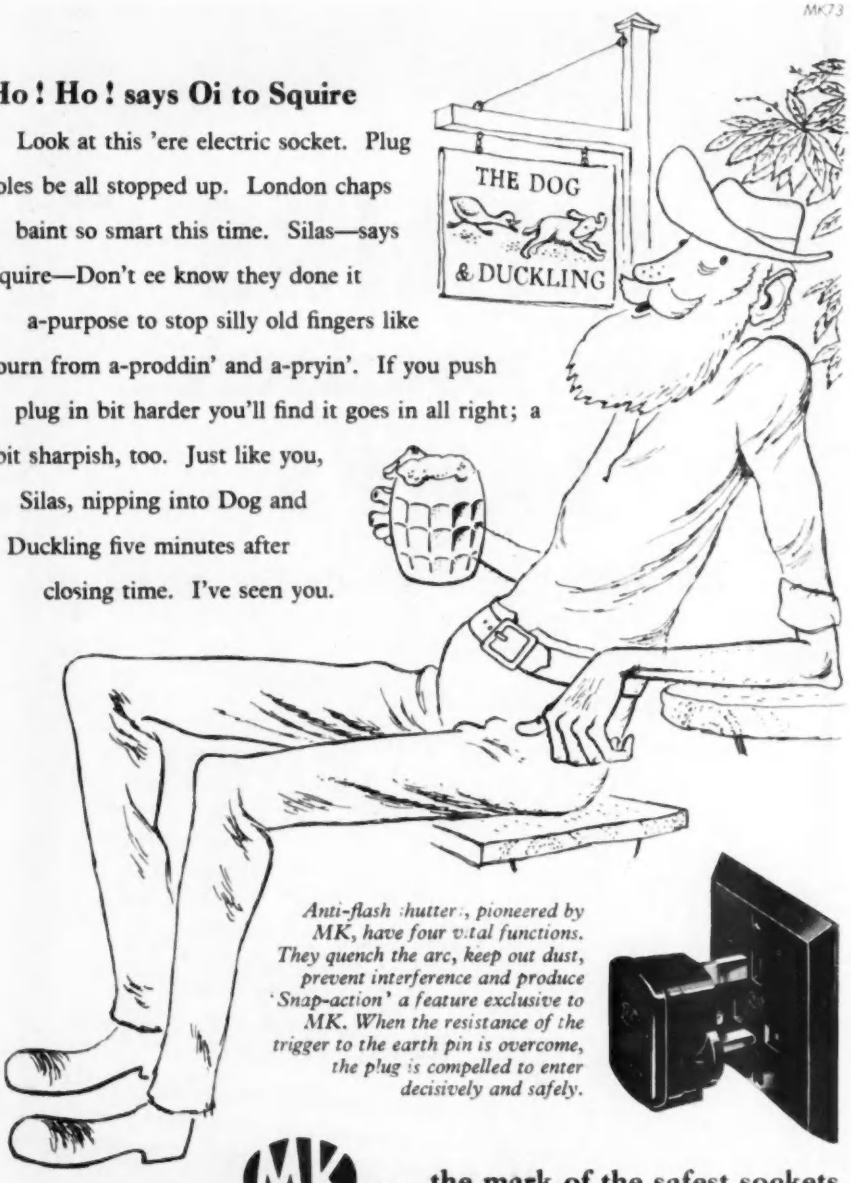

PHILIPS
TOP EFFICIENCY
LAMPS
give more light per penny spent
See the following efficiencies
230 Volt
25 W 220 Lumens
40 W 430 Lumens
60 W 725 Lumens
75 W 960 Lumens
100 W 1380 Lumens
150 W 2150 Lumens
200 W 2960 Lumens
All Philips lamps—where necessary in the interests of safety—are fitted with fuses and internally insulated caps.
PHILIPS
PHILIPS ELECTRICAL LTD.
Philips Electrical Limited, Century House, Shaftesbury Avenue, London, W.C.2
LAMPS & LIGHTING EQUIPMENT · RADIO & TELEVISION RECEIVERS · "PHOTOFLUX" FLASHBULBS

LD288

MK73

Ho ! Ho ! says Oi to Squire

Look at this 'ere electric socket. Plug 'oles be all stopped up. London chaps baint so smart this time. Silas—says Squire—Don't ee know they done it a-purpose to stop silly old fingers like yourn from a-proddin' and a-pryin'. If you push plug in bit harder you'll find it goes in all right; a bit sharpish, too. Just like you, Silas, nipping into Dog and Duckling five minutes after closing time. I've seen you.



Anti-flash shutters, pioneered by MK, have four vital functions. They quench the arc, keep out dust, prevent interference and produce 'Snap-action' a feature exclusive to MK. When the resistance of the trigger to the earth pin is overcome, the plug is compelled to enter decisively and safely.

MK

. . . the mark of the safest sockets

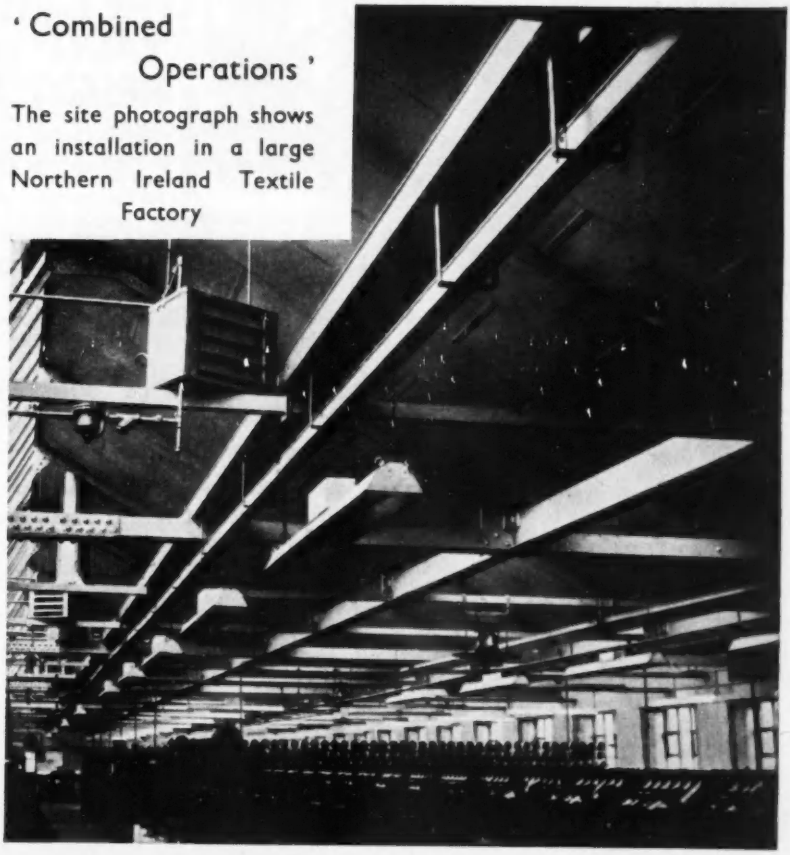
DH8 MK ELECTRIC LTD London N18 Telephone: Tottenham 5151

BUSBAR TRUNKING
AND
CABLE TRUNKING

IN INDUSTRY

'Combined Operations'

The site photograph shows an installation in a large Northern Ireland Textile Factory



London Office: Wellington House, 125/130 Strand, W.C.2
Telephone Temple Bar 1743

The Power Centre Co. Ltd.

Lloyd Street, Wednesbury,
Phone: Wednesbury 0507 Staffs. Grams: "Powcent" Wednesbury

TWW

New and Reconditioned
ELECTRICAL EQUIPMENT
from Stock

MODERN
DIRECT-COUPLED
DIESEL DRIVEN
ALTERNATING SETS

400/440 VOLTS, 3-PHASE, 50 CYCLES, 4-WIRE, 0.8 P.F.

500-kVA. "PETTER/BRUSH." Vert. six-cylinder, water-cooled Engine; prot. rev. Field Alternator, d/c Exciter, Switchgear, A.V.R.

187-kVA. "WAUKESHA-G.E.C." Vert. six-cylinder, rad.-cooled Engine; prot. rev. Field Alternator, d/c. Exciter, Switchgear, A.V.R. Two available.

118-kW. "BLACKSTONE/CROM.-PARK." Vert. five-cylinder, water-cooled Engine; prot. rev. Field Alternator, d/c. Exciter, Switchgear, A.V.R. Two available.

106-kW. "MIRRLEES/L.D.C." Vert. five-cylinder, water-cooled Engine; prot. rev. Field Alternator, d/c Exciter, Switchgear, A.V.R.

80-kVA. "RUSTON/HIGGS." Vert. five-cylinder, rad.-cooled Engine; prot. rev. Field Alternator, d/c. Exciter, Switchgear, A.V.R. NEW.

68.8-kVA. "CROSSLEY/BRUCE PEEBLES." Vert. six-cylinder, water-cooled Engine; prot. rev. Field Alternator, d/c. Exciter, Switchgear, A.V.R.

62.5-kVA. "McLAREN/BRUCE PEEBLES." Vert. five-cylinder, rad.-cooled Engine; prot. rev. Field Alternator, d/c. Exciter, Switchgear, A.V.R.

62.5-kVA. "PERKINS/METRO.-VICK." Vert. six-cylinder, rad.-cooled Engine; prot. rev. Field Alternator, d/c Exciter, Switchgear, A.V.R.

55-kVA. "RUSTON/E.E.C." Vert. five-cylinder, water-cooled Engine; prot. rev. Field Alternator, d/c. Exciter, Switchgear, A.V.R.

37.5-kVA. "PERKINS/HIGGS." Vert. six-cylinder, rad.-cooled Engine; prot. rev. Field Alternator, d/c. Exciter, Switchgear, A.V.R. NEW.

27.5-kVA. "CROSSLEY/CROM.-PARK." Vert. three-cylinder, water-cooled Engine; prot. rev. Field Alternator, d/c. Exciter, Switchgear, A.V.R.

25-kVA. "LISTER/METRO.-VICK." Vert. four-cylinder, rad.-cooled Engine; prot. rev. Field Alternator, d/c. Exciter, Switchgear, A.V.R.

20-kVA. "DORMAN/MAWDSLEY." Vert. three-cylinder, rad.-cooled Engine; prot. rev. Field Alternator, d/c. Exciter, Switchgear, A.V.R.

THOS. W. WARD LTD
ALBION WORKS · SHEFFIELD
'PHONE 26311 (22 LINES) 'GRAMS 'FORWARD'
LONDON OFFICE: BRETTENHAM HOUSE · LANCASTER PLACE · STRAND W.C.2

EP.1

Steam leakage means wasted fuel . . . stop it with a

Crockatt

VALVE RESEATER

This tool makes valves tight without disturbing the pipeline and can be operated by one man. Self-centring and suitable for flat or mitred seats, it gives a true face, free from knurling, in a few minutes. Moderate in price—write for full details.

ALSO: Feed Water Filters; Electric Salinometers; Boiler Tube Brushes; Floor Sanders; Terrazzo Polishers; etc.

W. CROCKATT & SONS LIMITED
79 DARNLEY STREET, GLASGOW S1, SCOTLAND

DECO CABLE REELING DRUMS
for all moving structures

DECO Electrical Products include

Contact Collector Columns, Limit Switches, Overhead Collector Equipment, Winch Limiting Mechanisms for Skip Hoists, Cranes and Mechanical Handling Plants, Cable Reeling Drums

DECO ENGINEERING CO. LTD.
West Row, N. Kensington, London, W.10 Ladbroke 3066-7

P307

They're lively lads at Lorival...

When it's a question of plastic or ebonite mouldings there's always a Lorival answer. They're lively lads at Lorival, with technique and imagination. They put a beautiful finish on their products, and they offer you pleasing design, keen prices and rapid delivery. You can safely leave it to them.

PAPER-FILLED UREA MATERIAL is the ideal medium for this Bathjoys Display Stand for Reckitt & Colman Limited. The design is rigid, yet without heavy sections, and the moulding is produced in one piece by the compression method. The colour chosen was cream, and recessed lettering in the front, filled in with green wax, provides a striking contrast.

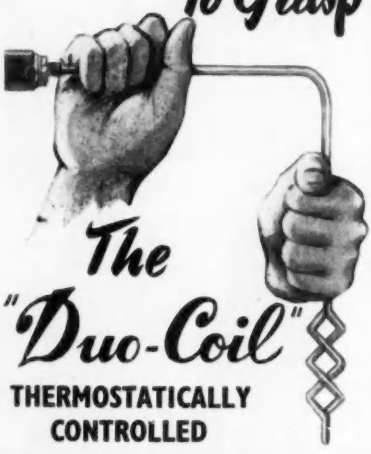
LORIVAL PLASTICS

United Ebonite & Lorival Ltd · Little Lever · Nr. Bolton · Lancs.

L.39

AN OPPORTUNITY

To Grasp



The "Duo-Coil"

THERMOSTATICALLY CONTROLLED

IMMERSION HEATER

FIRST IN THE FIELD
PROVED IN PRACTICE
LOWEST INSTALLED COST

Just look at the

PRICE from £3.15.3 (plus P.T.)

AND this includes the

THERMOSTAT

GILLOTT
ELECTRO STEAM COOKERS Ltd.

COTSWOLD WORKS, CHALFORD
Near STROUD, GLOS.
Telephone—Brimscombe 2276/7.

PLANNING OR ALTERING PLANT LAYOUT IS NOW *easier and speedier . . .*

Thanks to the NEW BARDUCT

ELECTRIC POWER DISTRIBUTION SYSTEM

The most compact and economical busbar equipment available today for loads up to 250 amps.

GET FULL DETAILS WITHOUT DELAY FROM

MARRYAT & PLACE LTD.

42 HATTON GARDEN
LONDON, E.C.1
Telephone: HOLBORN 8181

22597

CHEAPER ELECTRICITY with J. & P. Capacitors

In many factories electricity is costing far more than it need do — an uneconomic state of affairs which could be remedied immediately if the power factor of the electrical installation were improved. The improvement of power factor is a simple matter when J. & P. Capacitors are used, and the initial cost is repaid time and time again by the money saved on electricity bills. We would be pleased to test your installation, free of charge and without obligation. Why not ask us along and see what saving *you* could achieve with J. & P. Capacitors?

Quick deliveries are assured

PHOSPHOR BRONZE

FOR THE ELECTRICAL INDUSTRY
SHEET, STRIP, ROD, WIRE, TUBE, CHILL CAST BARS

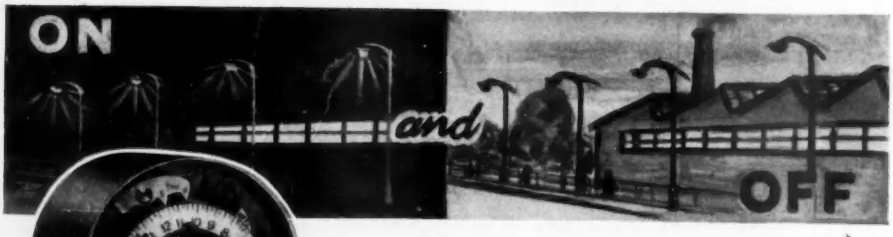
. . . In a range of alloys containing 3% — 12% Tin for specific purposes; to private specifications and to British Standard Specifications.

Clifford

ESTABLISHED 1767

CHARLES CLIFFORD & SON LTD., DOG POOL MILLS, BIRMINGHAM 30 and FAZELEY ST. MILLS, BIRMINGHAM 5
Offices: London, Glasgow, Manchester & Dublin

M-W.88



You can leave it to
HORSTMANN
for Reliable **TIME SWITCHES**

Horstmann Electric Time Switches are renowned for their unfailing reliability. The comprehensive range covers hand wound models (15,21 and 40 day run), electrically wound and synchronous models with or without spring reserve as required.

May we quote you for your requirements?

GRAMS HORSTMANN, BATH
TEL: BATH 7241

THE HORSTMANN GEAR CO LTD
NEWBRIDGE WORKS • BATH • ENGLAND

a portable viscometer

for industrial and laboratory use

***MODEL VL FOR LOW VISCOSITIES** (readings from* **0-625** *centipoises).*
***MODEL VM FOR MEDIUM VISCOSITIES** (readings from* **0-13,500** *centipoises).*
***MODEL VH FOR HIGH VISCOSITIES** (readings from* **0-20,000,000** *centipoises).*

Write for List IN 125

This instrument has been developed for industrial use with laboratory standards of accuracy. It gives a rapid continuous evaluation of the viscosity and flow properties of liquids or semi-liquids. A maximum indicating friction pointer is provided for use with thixotropic liquids.

Each model is mains operated with quick-change 3 or 5 speed gear box and sets of interchangeable inner cylinders.

Weight approximately 4 lb. Leather carrying case can be supplied.

FERRANTI

FERRANTI

PORTABLE VISCOMETER

FERRANTI LTD · MOSTON · MANCHESTER 10

London Office: KERN HOUSE, KINGSWAY, W.C.2.

FI 115

B.P.T Pole Mounting Transformers

for rural distribution

B.P.T. transformers in hermetically sealed stoneware containers for ratings up to 10kVA offer the following advantages:—

- No maintenance costs. Stoneware containers are salt and acid proof and the supporting steel work is heavily galvanised. Hermetically sealed container protects oil from acidity.
- Increased efficiency plus reduced operating costs due to low losses.
- High Overload Capacity.
- Simple installation—only one or two bolts required.

Other types of distribution transformers, including units to the Draft National Standard Specification T.1 in steel tanks, can be supplied.

Photograph shows typical rural transformer installation on Eastern Electricity Board System.

BRITISH POWER

BRITISH POWER TRANSFORMER CO., LTD.

Phone: HOWard 1492 QUEENSWAY, PONDERS END, MIDDLESEX *Telegrams: Vitrohm, Enfield*

BP/3101/CH

Clyde SOOT BLOWERS

BOILER AVAILABILITY INCREASED

ELECTRO-MECHANICAL OPERATION with SEQUENCE CONTROL

Improvements Over Manual Operations

1. No physical exertion required.
2. Soot blowing carried out in a quarter of the time.
3. Shorter period of abnormal combustion conditions.
4. Cleaner heating surfaces with higher and sustained rate of evaporation.
5. Saving in fuel and labour costs.
6. Increased boiler availability.

London—
34 VICTORIA ST., S.W.1
Telephone: ABBEY 1847

Manchester—
1 CHANCERY LANE, SPRING GARDENS
Telephone: DEAnsgate 4262

★

Clyde BLOWERS Ltd

CLYDEBANK . SCOTLAND

'Phone: CLYDEBANK 1576/77 'Grams: MURWILS, GLASGOW

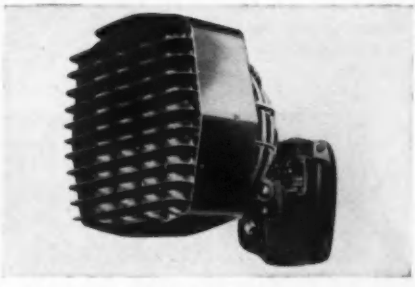
STOP burning money!

Away with old, expensive methods of heating! Consider the money-saving advantages of G.E.C. electric unit heaters:

- **low running costs**
- **cleanliness**
- **easy maintenance**
- **thermostatic control (if required)**
- **elimination of stoking, fuel storage and ash removal**
- **installation is simple and inexpensive**

G.E.C. electric unit heaters are ideal for factory and rest-room, workshop and meeting-hall. For full details write for publication H.5.

G.E.C. ELECTRIC UNIT HEATERS



★ ELECTRICITY ENSURES TRUE COAL ECONOMY

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

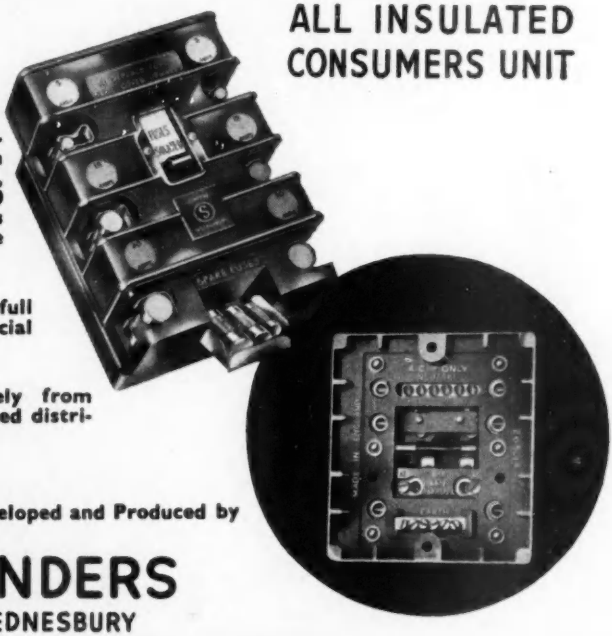
Here it is ... *Absolutely* NEW

EXTREMELY ORIGINAL
VERY COMPETITIVE

The

EG. 613

ALL INSULATED
CONSUMERS UNIT



SPECIFICATION.
60 amp. D.P. micro-break A.C. main switch controlling two 5 amp., two 15 amp. and two 30 amp. S.P. & N. circuits protected by cartridge fuses to BS.1361.

Write for Folder 149 for full wiring details and special features.

Obtainable immediately from the Company's appointed distributors.

Designed, Developed and Produced by

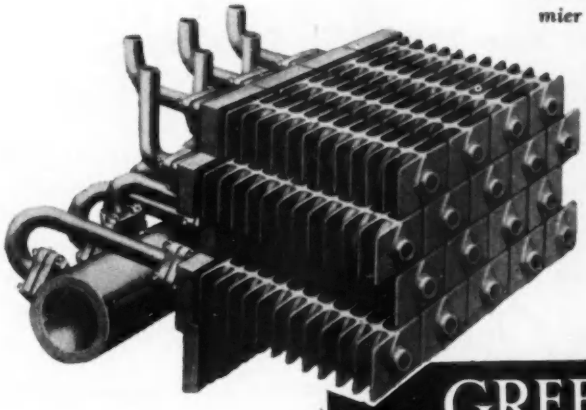
SANDERS
WEDNESBURY

WM. SANDERS & CO. (WEDNESBURY) LTD., WEDNESBURY, STAFFS.

A greater field of vision . . .

The arrangement of the heating surfaces in Green's Premier Diamond Economisers enables *every* portion to be adequately inspected—there are no dead spaces. The joints, too, are arranged for complete accessibility.

These are but two of the reasons why Type 12 Premier Diamond Economisers show maximum availability in practice. Note, too, the extended and compact heating surface of the cast-iron sleeves surrounding the steel tubes.



Type 12 Premier Diamond Economiser with steel tube construction — suitable for the highest working pressures.

GREEN'S ECONOMISER

E. GREEN & SON LTD · WAKEFIELD

Makers of economisers for more than one hundred years

GE103

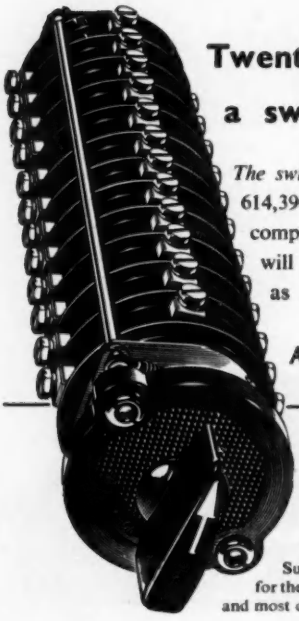
B

FAIR PLAY

SWITCH BLOCKS
built of KILN DRIED *timber*
STAY FLAT
AND CORRECT SHAPE

We invite your enquiries

WOOTTON & CO. LTD.
ALMA WORKS, PONDERS END
MIDDLESEX
TELEPHONE: HOWARD 1858
L3819D



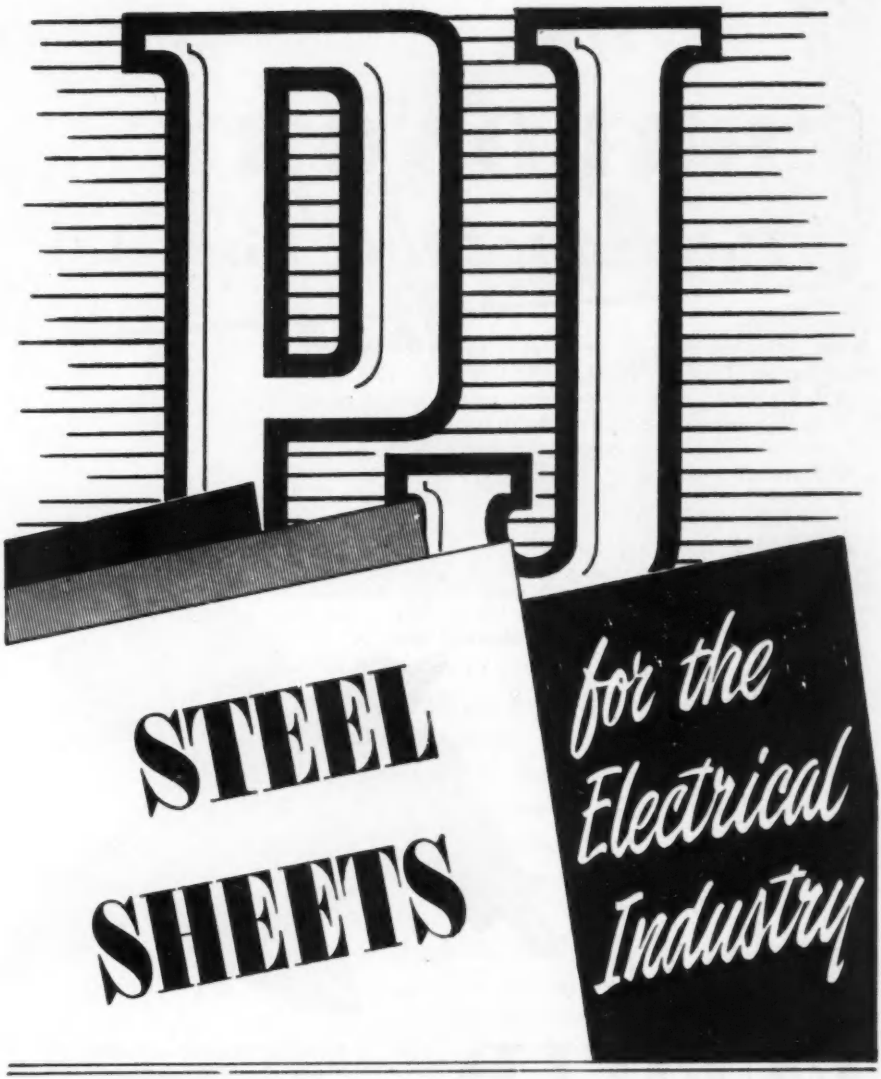
Twenty-four 22.5 kVA Circuits on
a switch that will lie in your hand

The switch is a 6 cell Austinlite 50. Its 24 pairs of contacts provide 614,390 different switching combinations—which gives some idea of the complexity of the circuiting these switches handle. The smaller A30 will handle up to forty-eight 7.5 kVA circuits—and is as versatile as the A50. Send for illustrated leaflet giving full particulars.

A Chance PRODUCT

AUSTINLITE LTD. (A Subsidiary of Chance Brothers Ltd.) Dept. A3
Lighthouse Works, Smethwick 40, Birmingham. West Bromwich 1824
London Office : 28 St. James's Square, S.W.1. Whitehall 6002

Austinlite switches are used and specified by :
The Admiralty ; British Electricity Authority ; The Air Ministry ; Ministry of Supply ; British Broadcasting Corporation ; General Post Office ; Crown Agents for the Colonies ; National Physical Laboratory ; Royal National Lifeboat Institution, and most of the leading electrical manufacturers in Great Britain.



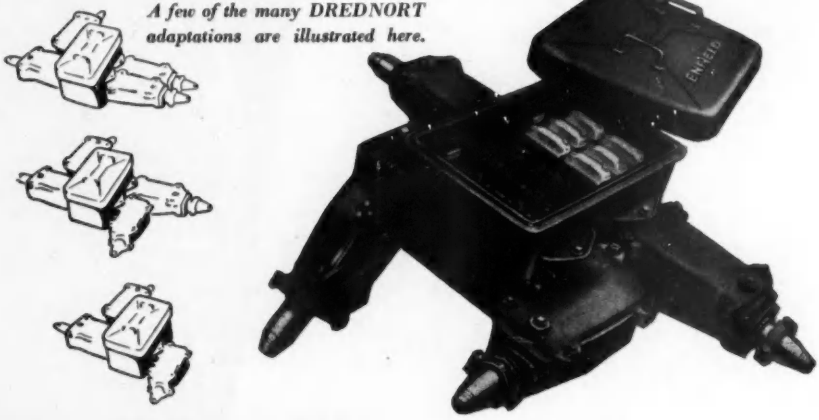
PARTRIDGE JONES & JOHN PATON LTD
PONTNEWYNYDD NEAR PONTYPOOL
Telephone: Pontypool 131/2

'DREDNORT'
The *Adaptable* Link Box

First patented over 30 years ago, these features still distinguish the ENFIELD "DREDNORT" link box:-

- **Detachable gland pockets (straight, angular or dipping) enable any distributor cable to be changed as load demands without disturbing inner assembly.**
- **Supplied with Links or H.R.C. Fuses.**
- **Duplicate Busbars and Links provided if required as a Selective Box.**
- **Supplied two or six ways (cables up to .3 sq. in. 4 core, or 5 core where fifth core does not exceed .0225 sq. in.)**

A few of the many DREDNORT adaptations are illustrated here.



ENFIELD CABLE ACCESSORIES

Specify ENFIELD and solve your distribution worries.

Light Engineering and Mains Cable Accessories Department
WEST ROAD, NORTHUMBERLAND PARK, LONDON, N.17.
TOTtenham 6611 (Works) London Office: HOLborn 9292

Enfield

(Photo by courtesy of Messrs. Babcock and Wilcox)

B.E.A.'s new Uskmouth Generating Station at Nash, near Newport, Mon., will draw its power supplies for switch operation and various emergency services from two Chloride storage batteries.

The first, consisting of 120 Chloride SFG10 cells with a capacity of 500 Ah at the 10-hour rate, will be used for emergency lighting and switch closing. It can supply the emergency lighting load of 50 kW for 30 minutes and at the end of that period have sufficient capacity remaining to operate the oil switches taking 197 amperes.

The second and smaller battery, comprising 55 Chloride DSG6 cells with a capacity of 150 Ah at the 10-hour rate will supply current for switch tripping, closing contactor coil operation, alarms and indicator lamps.

The trickle charger for the first battery and the complete control gear for the second battery were also supplied by the Company.

A PRODUCT OF CHLORIDE BATTERIES LIMITED

EXIDE WORKS, CLIFTON JUNCTION, SWINTON, MANCHESTER, AND GROSVENOR GARDENS HOUSE, GROSVENOR GARDENS, LONDON, SW1

MAKERS OF EXIDE BATTERIES

S.69

Quarter the thickness of a human hair

The average human hair is 4/1000 of an inch in thickness ('004" diam. if you'd rather be technical) and our finest enamelled copper wire is only 1/1000 when insulated with five separate coats of enamel; one pound of it would measure 316,000 feet or some 60 miles. Amazingly fine in every way—it must be, of course, to bear the name Connolly. Let us know if you'd like further details of this or any of our other winding wires.

The largest manufacturers of fine enamelled wire in the world.

CONNOLLYS (BLACKLEY) LTD., MANCHESTER, 9

Telephone: CHEETHAM HILL 1801 **Telegrams: "CONNOLLYS BLACKLEY"**

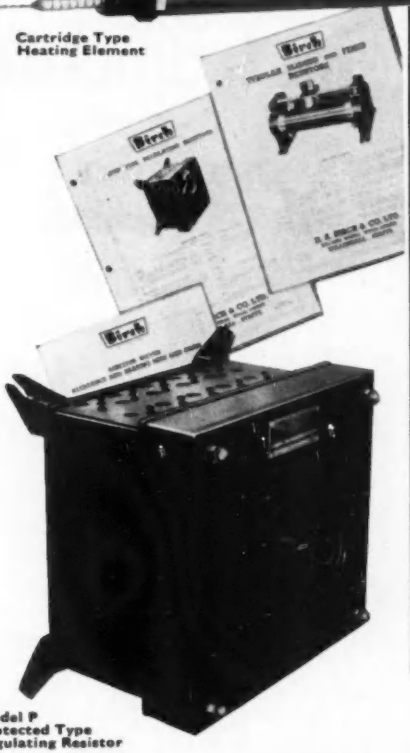
LONDON OFFICE:
34, Norfolk Street,
STRAND, W.C.2

BIRMINGHAM OFFICE:
15-17, Spiceal Street,
BIRMINGHAM, 5

Birch

Registered Trade Mark

Cartridge Type
Heating Element



Model P
Protected Type
Regulating Resistor

Specialists in the design and manufacture of

Asbestos Woven Resistor Grids
Asbestos Woven Heating Nets
Battery Charging Resistors
★ Cartridge Heaters
Dimming Resistors Slate Wound
Dimming Resistors Tubular
Dimming Resistors Stud Type
Fixed Resistors Slate Wound
Fixed Resistors Tubular
Heating Elements Mica Wound
Heating Elements Porcelain Wound
Loading Resistors
Motor Operated Resistors
Resistor Units Mica Wound
Resistor Units Porcelain Wound
★ Stud Type Resistors Series
★ Stud Type Resistors Shunt
★ Stud Type Resistors Potentiometer
Sliding Resistors Slate Wound
Sliding Resistors Tubular
Strip Heaters Metal Cased
Toroidal Resistors

Write for appropriate lists

H. A. BIRCH & CO. LTD.

WILOHM WORKS · WOOD STREET
WILLENHALL · STAFFS.

Telegrams: "Wilohm, Willenhall." *Telephone: Willenhall 494-495*
London Office: 33 Sudbury Court Road, Harrow. *Telephone: ARNold 2694*

ELLIOTT

Electrical recording and measuring instruments

Elliott 230 type Recorders are fitted with 3" continuous charts.

HIGH-SENSITIVITY RECORDER (Type 230)

A moving coil instrument of robust, compact construction, extensively used by the General Post Office, British Electricity Authority and other undertakings throughout the world. Available also in portable form (weight only 24 lb.) Adjustable maximum and minimum contacts can be fitted for operating alarms and regulating units.

SWITCHBOARD MEASURING INSTRUMENTS

ELLIOTT round pattern, moving iron instruments are available in 4" 6" and 8" sizes for projecting or flush mounting. Cases are of pressed steel. Movements are fully jewelled and efficiently damped for quick response and "dead-beat" action.

PROMPT DELIVERY FOR THE STANDARD RANGE

VISIT STAND **No. 5F,** *BRITISH INSTRUMENT INDUSTRIES EXHIBITION, OLYMPIA, JUNE 30—JULY 11*

ELLIOTT BROTHERS (LONDON) LTD., CENTURY WORKS, LEWISHAM, S.E.13 Phone: TIDeway 3212

Patents applied for.

FIRST COOKER IN BRITAIN with all these selling points!

The Revo Monarch Cooker is much more than a new model from a firm of over 50 years' standing—it's the most important news in Cookers for years. Never before has a Cooker with so much capacity sold for so low a price. Never before has any Cooker had *all* the Revo Monarch's labour-saving features. Never before have you had such a sales-opportunity—or a Cooker so simple to service. Study its amazing features—and send *now* for full details. THIS is a Cooker you'll want to know *everything* about!

REVO ELECTRIC CO. LTD. • TIPTON • STAFFS.

(and at London, Glasgow, Manchester, Leeds, Cardiff, Newcastle-on-Tyne, Belfast and Dublin.)

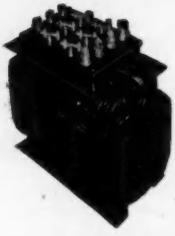
TO BE BACKED BY LARGE-SCALE NATIONAL ADVERTISING

GENRISTO *Boiling Plate*

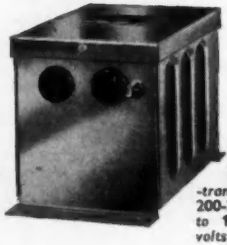
LTD.
OSMASTON ST. NOTTINGHAM

860w—6" dia.
SOLID PLATE
EMBEDDED ELEMENT
Volts—200/10 and
230/50

HEAYBERD TRANSFORMERS



A typical open type 3 - phase transformer.



A Model 402 Auto -transformer, 200-250 volts to 100 - 110 volts, 50 V.A.

From 8 V.A. to 100 k.V.A.

HEAYBERD Transformers are designed to give the utmost reliability and economy in operation, fully in accordance with the relevant British Standard Specifications.

We shall be pleased to quote for open, enclosed and oil-insulated transformers to suit your particular purpose.

Write for List 1044.

HEAYBERD

F. C. HEAYBERD & CO. LTD

Head Office GREENWICH SOUTH STREET, S.E.10. Phone TIDeway 4646 (3 lines)
Works Greenwich Cables & Telegrams "Heayberd, Green, London"

Lighting at the touch of a button

"Rythmatic" ripple control offers the street lighting engineer all the facilities he requires. One of the most important is that he can select lamps or groups of lamps for half-night, all-night and prior-dawn switching. He has also a "push-button" centralized control over the whole network from his H.Q. and can perform a desired switching operation at any time of the day or night—all selected lamps being affected simultaneously. The existing power circuits provide the signalling medium and the "on" and "off" timings are not disorganised by power cuts. The control switch requires no routine adjustment and has been designed to fit almost any type of housing.

The power engineer also benefits from "Rythmatic" ripple control for it enables him to improve his load factor. When used to its fullest advantage "Rythmatic" ripple control is a profitable investment for all concerned.

AUTOMATIC TELEPHONE & ELECTRIC CO. LTD.

STROWGER HOUSE, ARUNDEL STREET, LONDON, W.C.2. *Telephone: TEMple Bar 4506.*

Telegrams: Strowger Estrand London. Strowger Works, Liverpool, 7

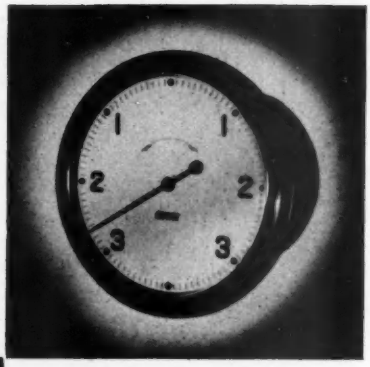
AT. 3781-CX23

Power Station Equipment for FREQUENCY CONTROL

Accurate Standard time—as provided by a GENTS' Master Clock—is essential for a correct comparison to be made with Frequency time in all power stations.

THE GENTS' COMPARATOR DIAL, operated from the Master Clock and the frequency supply, shows the loss or gain of Frequency time at any moment. The single, clearly read dial can be calibrated as required to suit all reasonable requirements.

Right : Comparator Dial, available with an 8" or 12" dial for panel mounting.



THE MASTER CLOCK, which is an accurate, precision time-keeping instrument, can also be used for controlling any number or size of "slave" clocks that may be installed in the boiler house gauge panel, turbine room, offices, etc., of the station, and can be fitted to give the half-hourly pulse for operating Printometers. Where impulses are also required for operating workmen's time recorders, the Master Clock can be suitably fitted.

Left : Impulse Slave Clock available in many different sizes and styles, both surface or flush fixing.

In fact, a GENTS' Master Clock can provide all the Standard time throughout the power station.

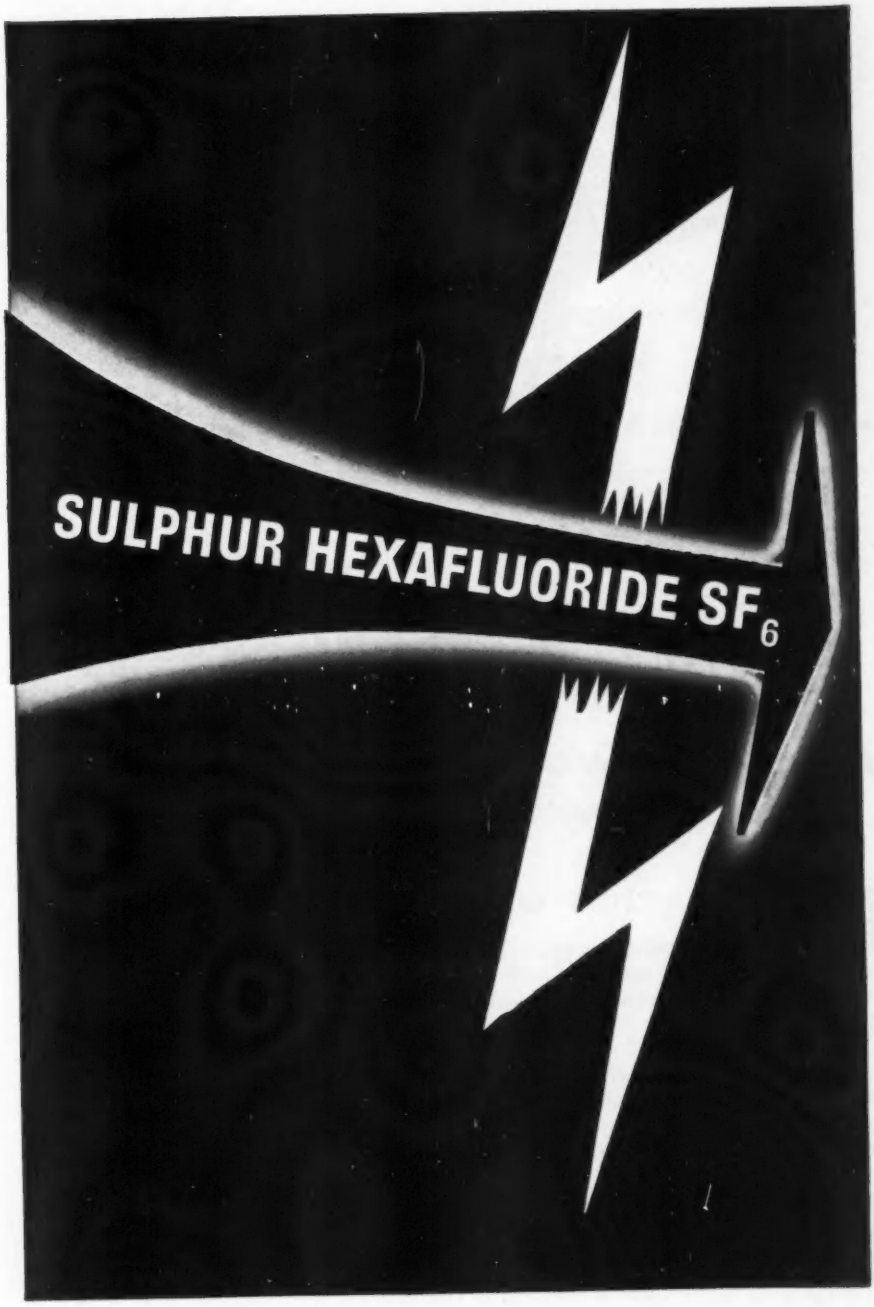
GENTS' OF LEICESTER

COMPARATOR DIALS AND MASTER CLOCKS

GENT & COMPANY LIMITED, FARADAY WORKS, LEICESTER

London Office and Showrooms: 47 Victoria Street, S.W.1
Also at: NEWCASTLE . BIRMINGHAM . BRISTOL and GLASGOW

Other Products: BELLS AND INDICATORS, FIRE AND BURGLAR ALARMS, TELEPHONES, CONTROLLED ELECTRIC CLOCK SYSTEMS, WORKMEN'S TIME RECORDERS, TOWER CLOCKS, PROCESS TIMERS, STAFF LOCATORS, LUMINOUS CALL SYSTEMS, MINE SIGNALLING EQUIPMENT, LIQUID LEVEL CONTROL EQUIPMENT, etc.


SULPHUR HEXAFLUORIDE SF_6

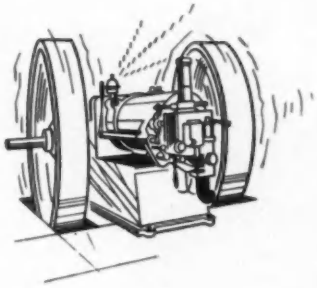
What's behind the nameplate?

TWENTY-FIVE years' experience in design and manufacture and an output of 17,000,000 kVA of transformers, in all types and sizes, including some of the world's largest.

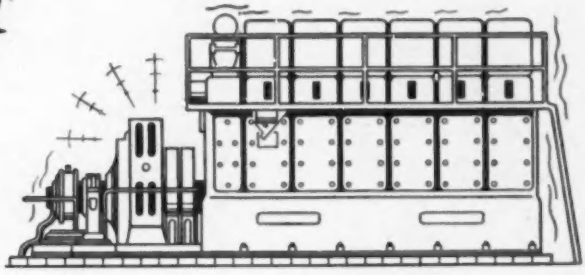
Such figures are a true measure of excellence, for they could have been achieved only by the maintenance of the highest standard in design and construction and on a basis of long and reliable service.

HACKBRIDGE AND HEWITTIC ELECTRIC CO., LIMITED
WALTON-ON-THAMES - SURREY - ENGLAND
Telephone: Walton-on-Thames 760 (8 lines) *Telegrams: "Electric, Walton-on-Thames"*

FASHIONS CHANGE



WITH AGE AND RACE—



BUT BRASS CONTINUES TO HOLD ITS PLACE

. . . particularly the fine quality products of James Booth including:—

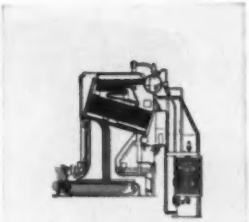
Seamless Drawn Tubes
Extruded Rods & Sections
Rolled Sheet & Strip
Formed Strip Sections
Drawn Strip & Wire
Large Forgings
Condenser Tubes
Domestic Water Service Tubing

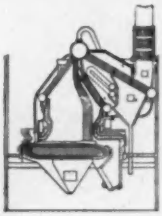
James Booth
AND COMPANY LIMITED

ARGYLE STREET WORKS · NECHELLS · BIRMINGHAM 7 · TELEPHONE: EAST 1521

885

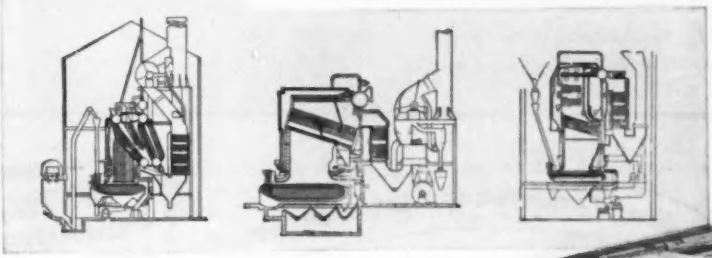
SELENIUM
SenTerCel
RECTIFIERS
REGD TRADE MARK
Rectifiers for Industry
Please write for Bulletin F/SRT6
Standard Telephones and Cables Limited
Registered Office: Connaught House, Aldwych, W.C.2
RECTIFIER DIVISION: Warwick Road, Boreham Wood, Hertfordshire
Telephone: Elstree 2401. Telegrams: 'Sentercel, Borehamwood'





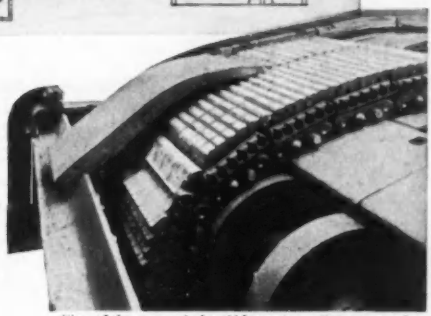
An 'L' Stoker for them all

For every known design and size of water-tube boiler there is a highly efficient 'L' type travelling grate stoker.



- *Close control of air supply*
- *Automatic cleaning of fire bars*
- *Burns efficiently any fuel from refuse to anthracite*
- *Remarkably low maintenance, with parts requiring attention easily accessible*

Please apply for full technical data



View of the rear end of an 'L' type travelling grate stoker

The result of Enterprising Engineering by ICL

INTERNATIONAL COMBUSTION LTD.

LONDON OFFICE: NINETEEN WOBURN PLACE, W.C.1. Works: Derby, England; Port Elizabeth, South Africa; Sydney, Australia.

ZENITH
(REGD. TRADE-MARK)

Automatic
VOLTAGE REGULATORS
with Electronic Control

Essential for many purposes where a constant pre-determined supply voltage is required, these Regulators are designed to give a controlled output voltage within 1% with input voltage variations up to plus or minus 10%. Manufactured for single- and three-phase loads from 5 up to 23 kVA per phase.

Please write for illustrated brochure, free on request

THE ZENITH ELECTRIC COMPANY LTD.

ZENITH WORKS, VILLIERS ROAD, WILLESDEN GREEN, LONDON, N.W.2

Telephone: WILlesden 4087-8-9 Telegrams: Voltaohm, Norphone, London

---

The world's most comprehensive display of Instruments

Nowhere in the world will you find an exhibition, specialising in instruments and instrumentation, of the size and scope of THE BRITISH INSTRUMENT INDUSTRIES EXHIBITION

Every field of instrumentation in Industry, Medicine, Research and Education is covered. You will be able to see all classes of temperature, pressure and flow controllers for industrial use, complete equipment for sea and air navigation and land surveying, British equipment for the research laboratory in pure and applied science, and precision equipment in such diverse fields as metrology and photography.

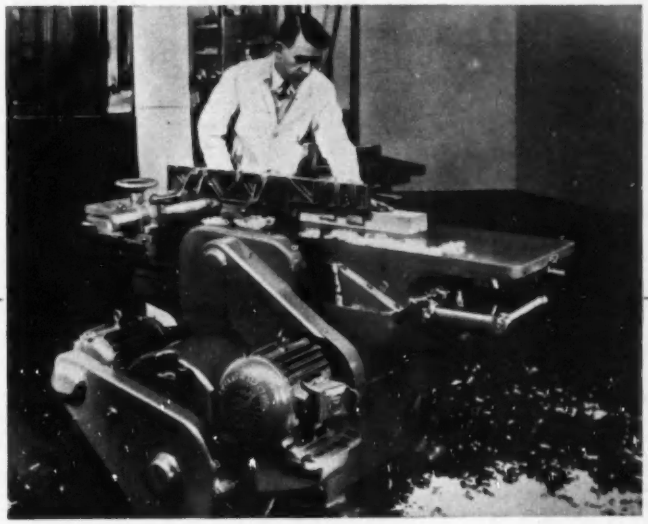
IT'S CORONATION YEAR!

Accommodation should be booked as early as possible. If you require any assistance, or an official catalogue of the exhibition if you are unable to come, write to the Organizers:—

The full scope of the products of the British Instrument Industry will be revealed at this exhibition. Present users of instruments and industrialists, whose problems might be solved by appropriate instrumental control, will find a visit to this exhibition extremely rewarding.

F. W. BRIDGES & SONS LTD.,
Grand Buildings, Trafalgar Square, London, W.C.2
Phone: Whitehall 0568. Telegrams & Cables: Segdirb, Rand, London

Specify 'ENGLISH ELECTRIC' LY Motors



Standardised for greater efficiency and easier maintenance, the 'LY' range of totally-enclosed fan-cooled motors complies with BS.168 and Draft Spec. CN(ELE) 6814 of the British Standards Institute. One of the many applications of these drives is here shown : B.203, two h.p. 2845 r.p.m., and B.204, three h.p. 2870 r.p.m., 'LY' motors driving a Wadkin 16" surface and thicknessing machine.

In producing the 'LY' range, 'ENGLISH ELECTRIC' drew upon fifty years' experience of design and manufacture. The result is a series of motors from which long and trouble-free service is assured.

'ENGLISH ELECTRIC'

industrial motors

THE ENGLISH ELECTRIC COMPANY LTD., Queens House, Kingsway, London, W.C.2

Industrial Motor Works, Bradford

WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

BM.12.

See the English Electric advertisement for Electronic Insulation Tester which appears on page 79 of this issue.

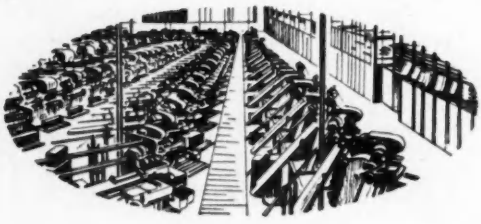
I know how . . .

WROTE LEONARDO

. . . but theories are not sufficient. Realisation must depend upon the techniques of PRODUCTION.

Today, men of ideas can call upon the immense store of engineering and production "know-how" of Plessey—whose main occupation is to apply tomorrow's methods of quantity production to the day-to-day needs of the aircraft, electronic and light engineering industries.

Managements in these industries are invited to call in Plessey to clear production bottlenecks.



WHEN IDEAS ARE TAKING SHAPE

CALL IN Plessey

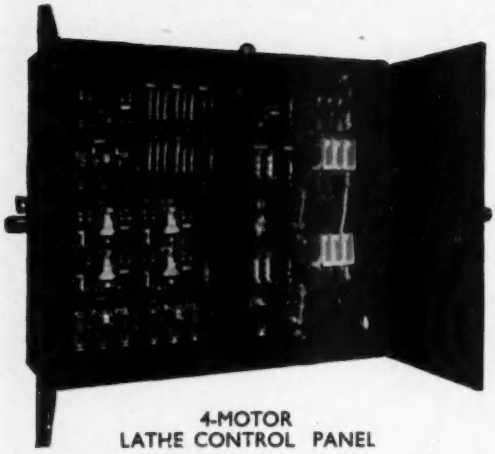
RADIO · TELEVISION · ELECTRONICS · HYDRAULICS · MECHANICS · AIRCRAFT EQUIPMENT

THE PLESSEY COMPANY LIMITED · ILFORD · ESSEX

RP/PP.1

METICALLY

IGRANIC ELECTRIC CONTROL GEAR



4-MOTOR
LATHE CONTROL PANEL

FAVOURABLE DELIVERY CAN NOW BE OFFERED FOR SPECIALLY BUILT CONTROL GEAR

FOR THE EFFICIENT PROTECTION OF VALUABLE MACHINERY AND FOR RELIABILITY SPECIFY:— IGRANIC CONTROL GEAR

SPECIALISED CONTROL EQUIPMENT FOR....

- AIR COMPRESSORS
- BLAST FURNACES
- CRANES AND TRANSPORTERS
- COAL HANDLING
- COKE OVENS
- FOUNDRIES
- LIFTS
- LAUNDRIES
- MACHINE TOOLS
- MOVING BRIDGES
- PAPER MILLS
- PRINTING MACHINERY
- PUMPS
- RUBBER MILLS
- REFRIGERATION PLANT
- STEEL MILLS
- SKIP HOISTS
- STONE GRADERS AND CONVEYORS
- SHIPS
- TEXTILE MACHINES
- WELDING MACHINES

MOTOR IGRANIC CONTROL

HEAD OFFICE AND WORKS - BEDFORD

EXPORT DEPT. : VICTORIA STATION HOUSE, 191 VICTORIA STREET, LONDON, S.W.1

BRANCH OFFICES: LONDON . BIRMINGHAM . BRISTOL . CARDIFF . GLASGOW . LEEDS . MANCHESTER . NEWCASTLE . SHEFFIELD

For highest speed with absolute precision—specify

No. 4 Turning and Screwing Brass Rods

Ever higher speeds demand ever greater precision—and British industry needs both if production is to be increased and costs reduced. McKechnie Brothers have developed a range of standard high-speed turning and screwing rods, including the popular ***No. 4*** and ***YS,*** all of which are guaranteed to combine the correct alloy and temper for maximum machine speeds and longest tool life. For full details of these and other MKB free machining rods please write to:—

McKECHNIE BROTHERS LIMITED

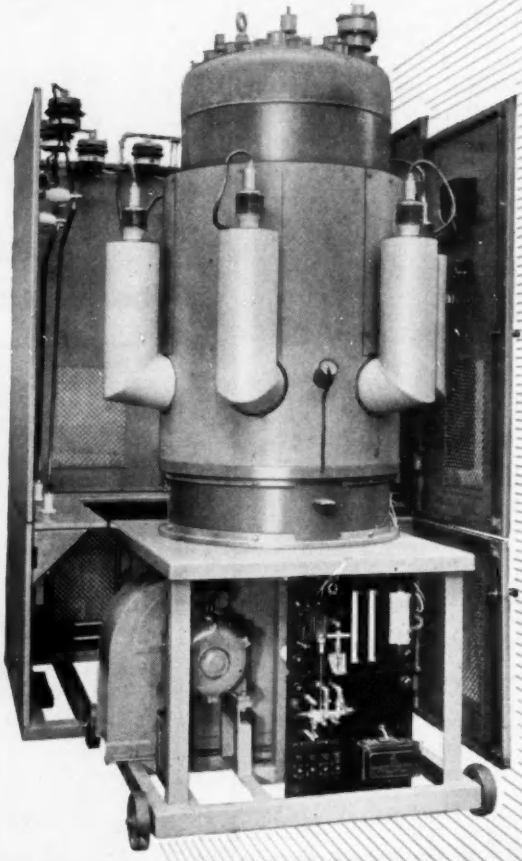
14 BERKELEY ST., LONDON, W.1. Phone: Mayfair 6182-3-4

Metal Works: Rotton Park Street, Birmingham, 16.

Other Factories: Widnes, London, South Africa, New Zealand.

Branch Offices: London, Leeds, Manchester, Newcastle-on-Tyne, Gloucester, Paris.

G.E.C. DRAWOUT
STEEL TANK RECTIFIERS



For ease of ***INSTALLATION INSPECTION MAINTENANCE***

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

Now available in TWO sizes

11 ins

Volex

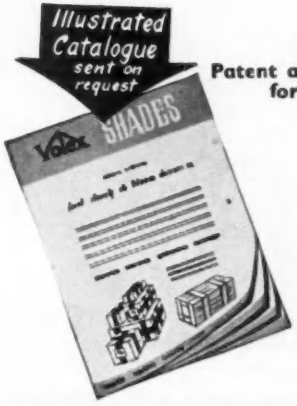
VENTICAL

(Registered)

PLASTIC SHADES

Supplied to County Councils, Post Offices, Public Works Departments, Electricity Boards and leading industrial concerns.

WHITE FINISH



Patent applied for

9 ins

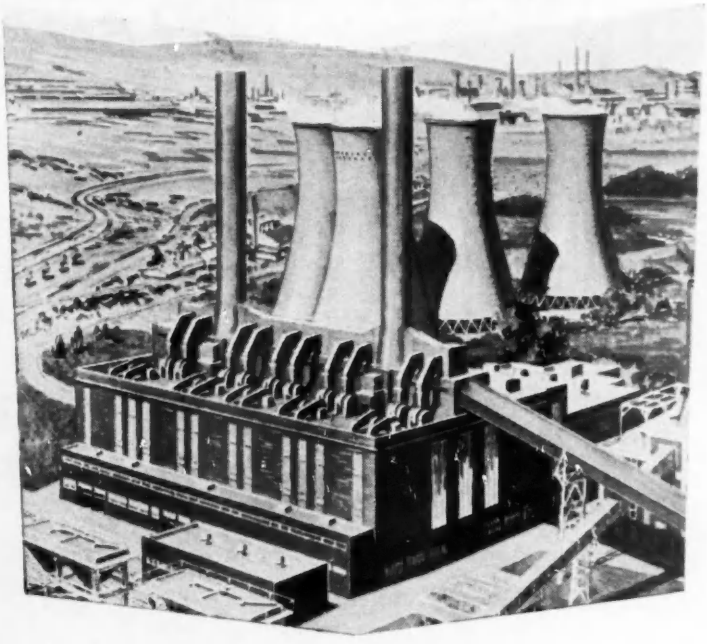
Stoutly designed shades with separate ventilated gallery. Allows ample ventilation and provides maximum illumination without glare.

Ideally suitable for use in Offices, Factories, Hospitals, Schools, etc.

VOLEX ELECTRICAL PRODUCTS LTD SALFORD 6

Telephone: PENdleton 4373 Telegrams: "VOLEXPROD", Salford 6

YARROW BOILERS



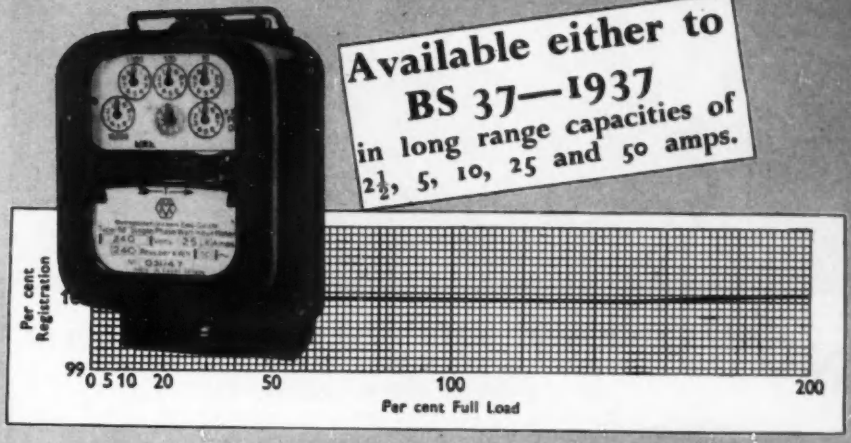
Pretoria 'B' Power Station

YARROW

and Company Limited

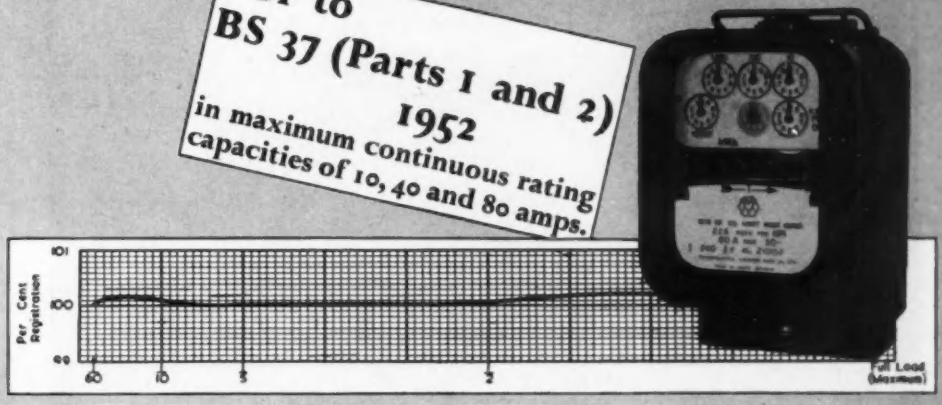
SCOTSTOUN · GLASGOW

Metrovick Type NF Meters



Available either to BS 37—1937
in long range capacities of 2½, 5, 10, 25 and 50 amps.

Or to BS 37 (Parts 1 and 2) 1952
in maximum continuous rating capacities of 10, 40 and 80 amps.



In designing the Type NF meter Metrovick engineers anticipated the requirements of the 1952 specification, consequently the two patterns are fundamentally similar.

METROPOLITAN-VICKERS ELECTRICAL CO. LTD., TRAFFORD PARK, MANCHESTER 17
Member of the A.E.I. group of companies

METROVICK *equipment for meticulous metering*

G/A 201

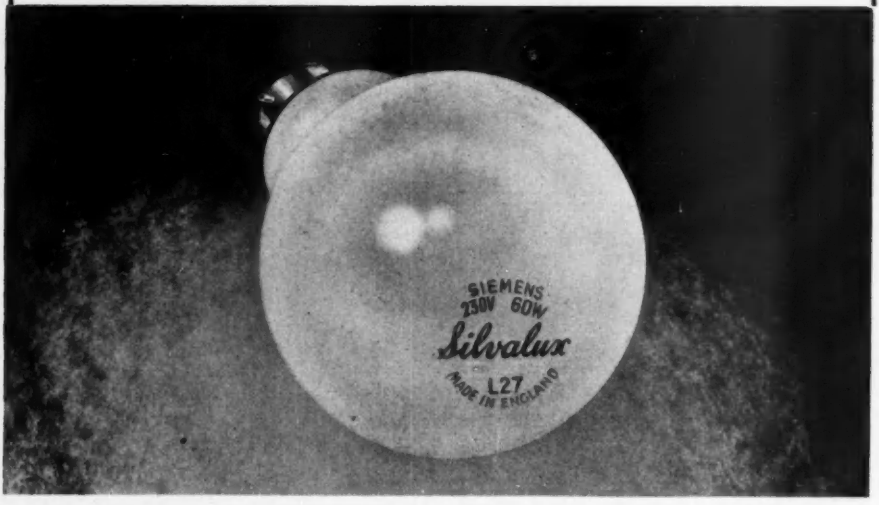
SIEMENS
Silvalux LAMPS

NOW AVAILABLE WITH SINGLE COIL FILAMENTS
in voltages from 200 to 260

40 W ... 1s. 6d. plus P.T. 3½d.
60 W ... 1s. 6d. ,, 3½d.
100 W ... 2s. 0d. ,, 4½d.

★ SIEMENS SILVALUX LAMPS with Coiled-Coil filaments are also available in the same ratings.

MADE IN ENGLAND



***Advt. of* SIEMENS ELECTRIC LAMPS AND SUPPLIES LIMITED, 38/39 Upper Thames Street, London, E.C.4**
Branches at: Belfast, Birmingham, Bristol, Cardiff, Dublin, Edinburgh, Glasgow, Leeds, Liverpool, Manchester, Newcastle-on-Tyne, Nottingham, Sheffield

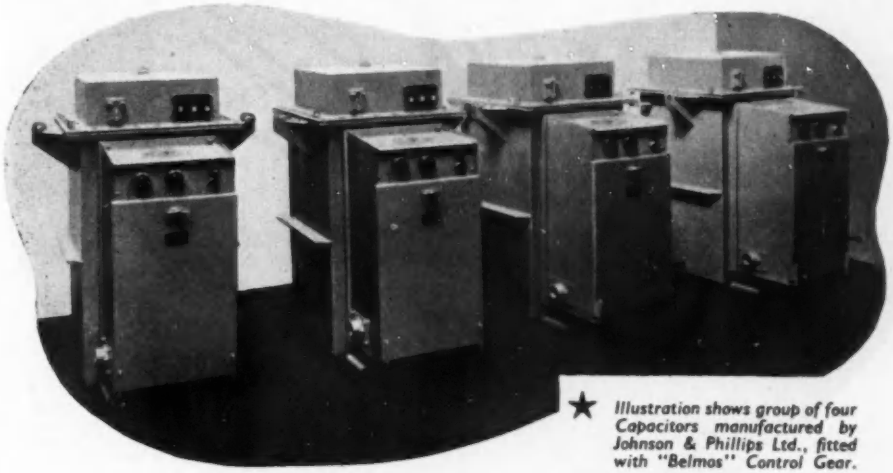
capacitor control panels....

The most reliable method of Power Factor Improvement is by means of Capacitors.

The most reliable method of control is by "Belmos" Capacitor Control Panels, either fitted to the Capacitor Unit or separately mounted.

Features to meet individual requirements can be incorporated, including HRC Fuse Protection, individual isolating switches, and indicating lamps.

When specifying Capacitors it will pay you to specify "Belmos" Control Gear.



★ *Illustration shows group of four Capacitors manufactured by Johnson & Phillips Ltd., fitted with "Belmos" Control Gear.*

the Belmos company limited

BELLSHILL • LANARKSHIRE

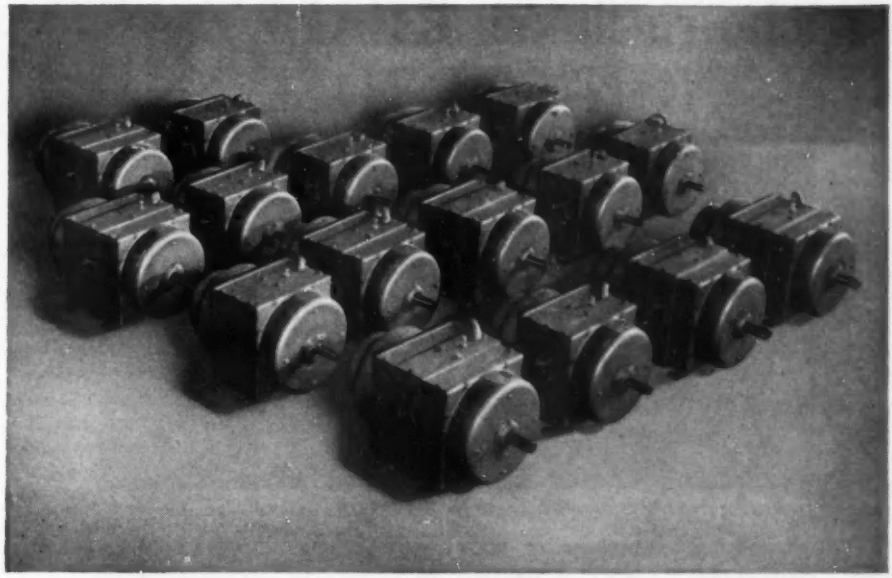
LONDON OFFICE: COLUMBIA HOUSE, ALDWYCH, LONDON W.C.2

Another Featherweight Cable

Single and Multi-pair Telephone Distribution Cables—Copper Conductors—Insulated with Polythene-Cores coloured for easy Identification—Polythene Taped—Screened with Aluminium Tape—Protected with a sheath of Polythene—for direct burial in the ground. A further protection comprising two impregnated cotton braidings can be provided where the cable is to be suspended overhead from a Catenary. Joint boxes are available for all sizes of cable.

STERLING

STERLING CABLE COMPANY LIMITED
ALDERMASTON BERKSHIRE
Telephone Reading 1000 Telegrams Sterling Phone Reading



Something New!!

for small generating sets

BRUSH engineers, backed by the Company's experience in the building of electrical rotating machines have developed, to meet world market demands, this new Square Path Alternator. It is built in a range of sizes with outputs from 1½ to 35 kVA, self regulating, self excited.
Compared with conventional machines of similar output, it has smaller dimensions, is lighter in weight, and yet maintains the high efficiency for which Brush products are so well-known.
Write today for our new Publication No. 21043B.

- ★ **Clean Square Design**
- ★ **Lighter Weight**
- ★ **Robust Construction**
- ★ **Low Initial Cost**
- ★ **Space Saving**
- ★ **Reduced Maintenance**
- ★ **High Electrical Generating Efficiency**

SQUARE PATH alternators by **BRUSH**

THE BRUSH ELECTRICAL ENGINEERING COMPANY LTD • HOPKINSON WORKS • CARDIFF • GT. BRITAIN

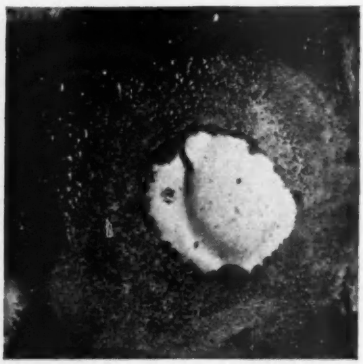
Advisory Engineers are available at our Sales Offices :

828

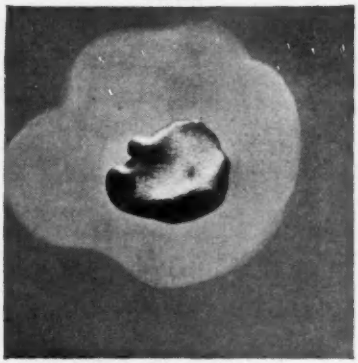
BIRMINGHAM • BRISTOL • CARDIFF • GLASGOW • LEEDS • LONDON • MANCHESTER • NEWCASTLE • SHEFFIELD

Alcho-re fluxes REALLY ARE NON-CORROSIVE

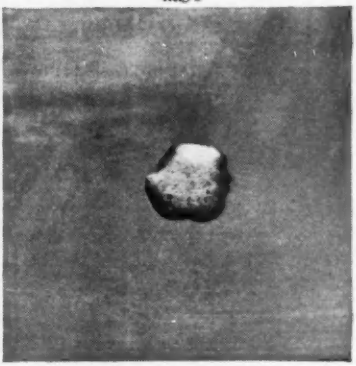
Residue from Alcho-re after three months



Residue from ordinary flux after three days



Fluxed with Alcho-re



Fluxed with plain resin

Spread of solder on copper

Alcho-re fluxes REALLY ARE NON-CORROSIVE

The term non-corrosive is applied to Alcho-re fluxes because they have passed the strict tests of our Research Department and have the official approval of A.I.D., M.O.S., A.M., etc. The superiority of the Alcho-re fluxing has been endorsed not only by scientific tests but throughout industry where freedom from corrosion is essential.

Export enquiries also welcome.

A.I.D. APPROVED ORGANISATION

FRY'S METAL FOUNDRIES LIMITED

TANDEM WORKS · MERTON ABBEY · LONDON SW19 · MITCHAM 4023

and at MANCHESTER, GLASGOW, BRISTOL, BIRMINGHAM AND DUBLIN

ELECTRICAL TIMES

Volume 123 No. 3216 25 JUNE, 1953

PUBLISHED EVERY THURSDAY

Editor and Managing Director:
ROY BALDWIN
M.I.E.E., Barrister-at-Law

Assistant Editors:
J. K. JOHNSON
B.Sc. (Eng.), A.M.I.E.E.

K. C. POUNDS
B.Sc. (Eng.), A.M.I.E.E., A.C.G.I.

D.C. SHUNT MOTORS DRIVING VARIABLE SPEED LOADS, by R. Wells, A.M.I.E.E.	1177
THE I.C.E. CONVERSAZIONE	1180
INTERCONNECTION WITH FRANCE	1181
OUR READERS' VIEWS	1182
ELECTRICAL CONTRACTORS AT BOURNEMOUTH ...	1184
WIRING—YESTERDAY, TODAY AND TOMORROW. Part II, by J. Mellanby, M.A., A.M.I.E.E., M.Inst.F. ...	1187
NOTES ON WIRING, by Megohm	1191
POWER SUPPLY IN MAY	1192
PROBLEMS AND PRACTICE IN ENGINEERING ...	1194
EUROPEAN HYDRO-RESOURCES	1195
MORE CAPITAL FOR RURAL ELECTRIFICATION ...	1196
TWO MORE SCOTTISH PROJECTS	1197
OVERSEAS NEWS	1198
PERSONALITIES IN THE INDUSTRY	1200
EXPORTS AND IMPORTS	1203
FIXING IN CONCRETE MADE EASY	1204
INTRODUCING THE REVO MONARCH	1204
THE BUYER'S COLUMN	1205
THE WATCH OF THE FUTURE?	1207
GERMANIUM TRIODE IN PRODUCTION	1207
THE WEEK IN NEWS	1208
Questions in Parliament	1213
Electric Supply News	1214
Company Activities	1214
COMMERCIAL INFORMATION	1216
CLASSIFIED ADVERTISEMENTS	55
INDEX TO ADVERTISERS	62

ESTABLISHED 1891

SUBSCRIPTION RATES—United Kingdom and Overseas £2 10s. 0d. per annum. Canada C$7·50c., U.S.A. $7·50c. per annum. Subscriptions are payable in advance and may commence with any issue throughout the year. Overseas subscriptions may be paid to The Electrical Times Limited by banker's draft, cheque or international money order. Single copies are obtainable, price 9d. each.

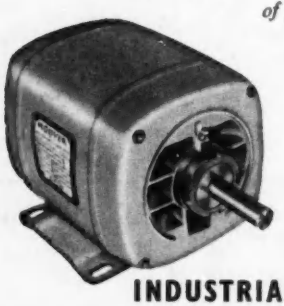
SARDINIA HOUSE, SARDINIA ST., LONDON W.C.2

Telephone: HOLborn 6016 Telegrams: EQUIVOLT, ESTRAND

THE POWER OF A NAME

WHEN a man is famous enough the mention of his name calls up an instant impression of his face and character. In certain cases mere initials can do the same. The letters 'W.G.' most certainly suggest the impressive appearance and famous achievements of the most renowned cricketer of all time.
Linked with the name Hoover, the initials 'F.H.P.' have a similar power. To manufacturers everywhere they represent a fractional horse power motor that is unsurpassed for efficiency and quality, that will give the same smooth service for the whole of its long life. These manufacturers have *proved* that the name Hoover F.H.P. represents the world's finest 'fractional' — with the world's finest service plan to back it.

The Hoover F.H.P. Motor combines superb quality with competitive price. Please write for name and address of your nearest distributor.



HOOVER LIMITED

INDUSTRIAL PRODUCTS DEPARTMENT

CAMBUSLANG · LANARKSHIRE · SCOTLAND

Editorial

CALL TO ARMS

THE ban on promotional activities has been lifted: the green light has been given to the nationalised industry to show the sort of a job it can make of selling electricity. Thus ends two years of back-stairs discussions and some six months of hourly expectation, awaiting the official announcement. Already the advertising programme on cookers and water heaters is under way and this will be stepped up in the coming months. But advertising alone is not enough. To spend some thousands of pounds on advertising and then consider the job as done, is shelving responsibility. Every member of the industry must regard this problem of publicity as his own and must never hesitate to give the lie to the calumnies to which electricity is subjected. And this applies to those at the top equally to those in the middle and lower ranks. Gone are the days when electricity was regarded as something of a wonder; when it was largely its own salesman. Now it is assessed strictly as no more than one of three competing fuels. Moreover, we have to cut through the jungle of prejudices and downright falsehood that has grown up in the past five years. Never have we had to face a task of this magnitude, never has there been such a need for every individual to see that electricity gets a fair hearing before the consumer.

INTO THE COUNTRY

GOVERNMENT encouragement for the supply industry to accelerate its investment programme for the countryside is another breath of freedom to get on with the job, and all will welcome it. Yet it cannot be ignored that any speeding up of the spread of electrification into the country is going to intensify the economic problems of the industry: there will be still more complaints both by consumers asked to give capital contributions, guarantees of consumption and line rentals and by area boards asked to carry out uneconomic extensions. Typically, perhaps, the official answer to this difficulty is indicated by the grant of another freedom—freedom to sell electricity unhampered by restrictions on advertising and salesmanship. In the long run this should result in a welcome reduction of costs, but it can have only a minor effect at first. It is significant that although some speakers in Friday's House of Commons debate mentioned the possibility of a Government subsidy, the Minister in his statement entirely avoided this thorny subject. The two industries involved, agriculture and electricity supply, are left with the task of financing this increased activity to which the Government has given its blessing: any balancing of the burden between individual boards must be carried out within the industry. The Minister indicated, in effect, that no subsidy is to be expected. Responsibility for keeping costs at a level the farmer can afford is placed squarely on the shoulders of the B.E.A.

NO H.P. HARMONY

IT is no secret that relations between electrical contractors and the B.E.A. have hardly been harmonious, but Mr. Trace's presidential address to the E.C.A. Conference showed by its tone, as well as its words, that relationships appear to have deteriorated in the past months to an unhealthy degree. Although there is a strong feeling that in installation work competition met from some area boards is uneconomic, the more serious grievance appears to be centred on retailing, and especially on the financing of hire purchase and similar schemes. It is in the interests of neither the country nor the industry itself that the electrical contractor and retailer should be forced out of business. What is more, area

boards have a vested interest in seeing that traders are commercially active and financially healthy. On the other hand, area boards from their statutory position enjoy favoured conditions which enable them to offer better terms, and they would be failing in their duty if they did not make use of them. That is the dilemma to be resolved. With conflicting interests on either side of the table, it will not be easy. Let us hope the discussions will be continued in greater harmony than appears to have existed during the past year.

PRESSURE ON DISCOUNTS

WHENEVER discounts are discussed, the electrical retailer is prompt to express his dislike for all price advantages granted to the user who claims that he is out of the ordinary. In spite of the excellent work of the Fair Trading Council, contractors and retailers are not happy with the present pattern of discount, and Mr. Trace expressed this dissatisfaction strongly in his address. He finds the crux of the difficulty in the failure of the industry to achieve one of the basic aims put forward in its own statement of fair trading principles; to ensure that the function of each section of the industry is defined and understood. He calls for a "really spectacular" review of the industry's trading structure, but unfortunately the limitations of a presidential address prevented him from developing in detail this proposal. He does not say who is to conduct this review, nor how will it help the electrical contractor. However much the case is argued for reducing or abandoning the discount to the "special large buyer" and the "recognised user," a change at present is unlikely, for the whole trend of business is towards more favours for the buyer. Mr. Traces' suggestion will need a more convincing argument before any action is taken on it.

BACK PRESSURE ECONOMICS

ANOTHER Government form is on its way to industrialists. Larger coal users are to be asked to give quantitative details of their use of electrical energy and process steam so that the potentialities of back-pressure generation over the whole country can be estimated. No doubt the results of this survey will prove of great interest to all students of engineering: but will their value be commensurate with the work involved? Beyond the question of the technical feasibility of back-pressure generation in a given installation, looms the more generally decisive consideration of financial attractiveness. It was shown in the paper which Messrs. Pedder and Prosser read to the recent B.E.P. Convention, that although in many large factories the use of back pressure or pass-out turbines would pay its way, and indeed, save large quantities of coal, often these savings would not be sufficient for such schemes to compete successfully with other claims for investment capital. The fact, that loans for such plant will now be available from Government sources, interest free for the first two years, may be decisive in some borderline cases, but is unlikely to have any great overall effect. Certainly not to the extent that any technical potentialities which may be revealed by the proposed survey will be likely to become practicable.

SCOTS EQUITY

REPORTS that gas for cooking and electric wiring only for lighting in council houses is considered by the Dumfries Town Council to be "equity and justice for all," show need for vigilance. We cannot see it like that; we doubt if the South West Scotland Electricity Board will, and we are certain that the housewife who has experienced the advantages of electric cooking will completely fail to appreciate the point. She will also find it hard to believe, as the Council apparently does, that 82% of women prefer gas for cooking—a figure new to us, and one whose source seems shaded in uncertainty. The last authentic figure for Scotland was determined by the Scottish Home Department during the war and it is 59% for electric cooking. Dumfries Council should really be better informed.

Meteor

D.C. Shunt Motors Driving Variable Speed Loads

A Novel Method of providing Simultaneous Armature and Field Control

By R. WELLS, A.M.I.E.E.

IN a previous article (ELECTRICAL TIMES, April 17, 1952) the subject of the variation of the electrical and mechanical quantities when a variable speed shunt motor drives a load the torque of which varies inversely, remains constant, varies directly, and varies as the square of the speed, was dealt with. This article was based on the use of the usual method of control in which only one of the two controlling quantities is varied at a time—the armature voltage increasing up to full value while the field current is constant at full value, and thereafter the field current being decreased while the armature voltage is constant at full value.

In a later article (ELECTRICAL TIMES, September 25, 1952) the same subject was dealt with on the basis of speed control being obtained by a simultaneous variation of the two controlling quantities, and a particular example was used in which it was assumed that a variation of armature voltage from 40% of full value to 100% of full value, was accompanied by a variation in field current from 100% of full value to 40% of full value taking place at the same time.

It was pointed out in this article that the only disadvantage to the method of obtaining speed control by a simultaneous variation of the two controlling quantities is the minor one which occurs when a grid-controlled mercury arc rectifier is used as the means of supplying the armature, as in this case the lower than usual armature voltage required to attain a particular speed when driving a particular load means that the rectifier is operating at a slightly lower than normal power factor. It was also pointed out that this disadvantage becomes negligible where the torque varies directly, or as the square of, the speed.

The principal advantage claimed for using the principle of simultaneous variation of armature and field is that the controls become easier to arrange, it being, for example, much more simple to gang two rheostats for simultaneous operation than to arrange for the first to remain stationary during the complete movement of the second and then for the second to remain stationary during movement of the first.

It was further pointed out that the method of simultaneous control did not involve the use of larger capacity mains, apparatus, or motors, than would otherwise be necessary, and in view of the simpler controls it is a method well worth consideration.

Having dealt then with the variation of the relevant quantities for the case of conventional control, and having covered the same

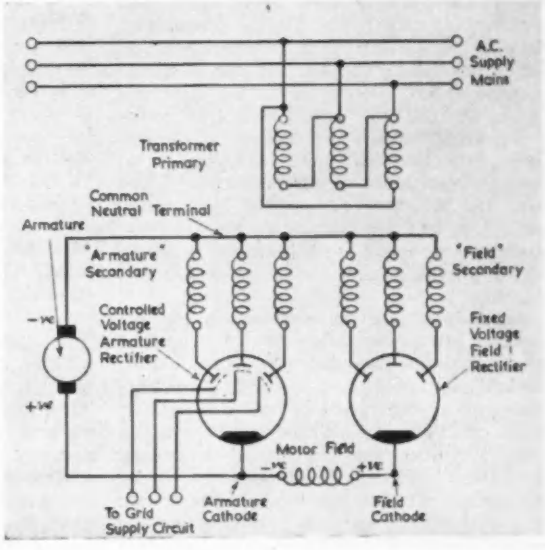
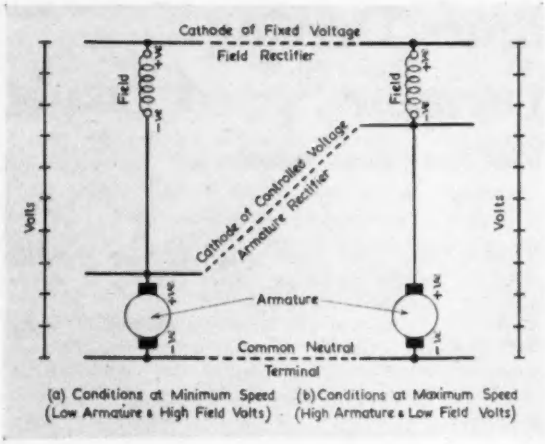


Fig. 1. Schematic circuit diagram of arrangement to obtain simultaneous armature and field control



Figs. 2(a) and 2(b). Potential diagrams to illustrate the principle of operation of the circuit as shown in Fig. 1

subject for simultaneous armature and field control, it is now proposed to describe a method of achieving simultaneous control which further enhances the control simplification by dispensing with one control entirely and making the remaining control instrumental in bringing about an increase of armature voltage and a decrease of field current at the same time.

Circuit Arrangement Used

Fig. 1 is a schematic circuit diagram of the arrangement as used to achieve simultaneous armature and field variation by controlling one rectifier only. This diagram is only intended to show the principle of operation and in practice the arrangement may take any one of many possible forms. For example, the armature can be supplied by a Ward-Leonard set, or by a free-firing mercury arc rectifier with some form of voltage control other than by grids, or by a grid controlled rectifier as shown. Likewise, the field may be supplied by a metal rectifier, or by a free-firing mercury arc rectifier as shown, but it will in either case be unnecessary to provide any form of output control for this item.

Again, two separate transformers can be used, or one as shown having two secondary windings, or one transformer having an "overwound" section for the "field" secondary. Again, an arrangement with only one rectifier vessel could be used with the small free-firing "field" anodes and the larger controlled "armature" anodes both contained within it. In this case, of course, since there would be but one cathode, the secondary windings would need to be separate in order to provide two negative terminals.

The principle of operation is best understood by reference to the potential diagrams shown as Fig. 2, (a) and (b). These diagrams do not show the anode voltages or the ripple components but only the average d.c. voltage of the main terminals. Fig. 2 (a) shows the conditions at starting or minimum speed where the armature voltage is low and the field voltage (and therefore the field current) is high. By the simple act of increasing the output voltage of the armature rectifier the conditions change to those shown at Fig. 2 (b) where the armature voltage is high and the field voltage is low. It will be understood then that with this circuit arrangement it is no more difficult to provide a control which gives increasing armature voltage and simultaneously decreasing field current than it is to provide the control for a simple, single-circuit rectifier or Ward-Leonard set.

Method applied to Existing Motors

It will be appreciated that if existing motors of standard design (i.e. motors having armature and field designed for operation at the same voltage) are to be used in conjunction with this scheme, it is not possible to achieve the ideals of zero armature volts with full field for starting, combined with full armature volts and the necessary amount of field reduction for the required operating top speed. This is so because with this circuit arrangement, EA + EF = k, and at starting EA is ideally zero while EF is 100%, but when running EA is ideally 100% but EF must not be zero. (EA = armature voltage while EF = field voltage, and k = a constant).

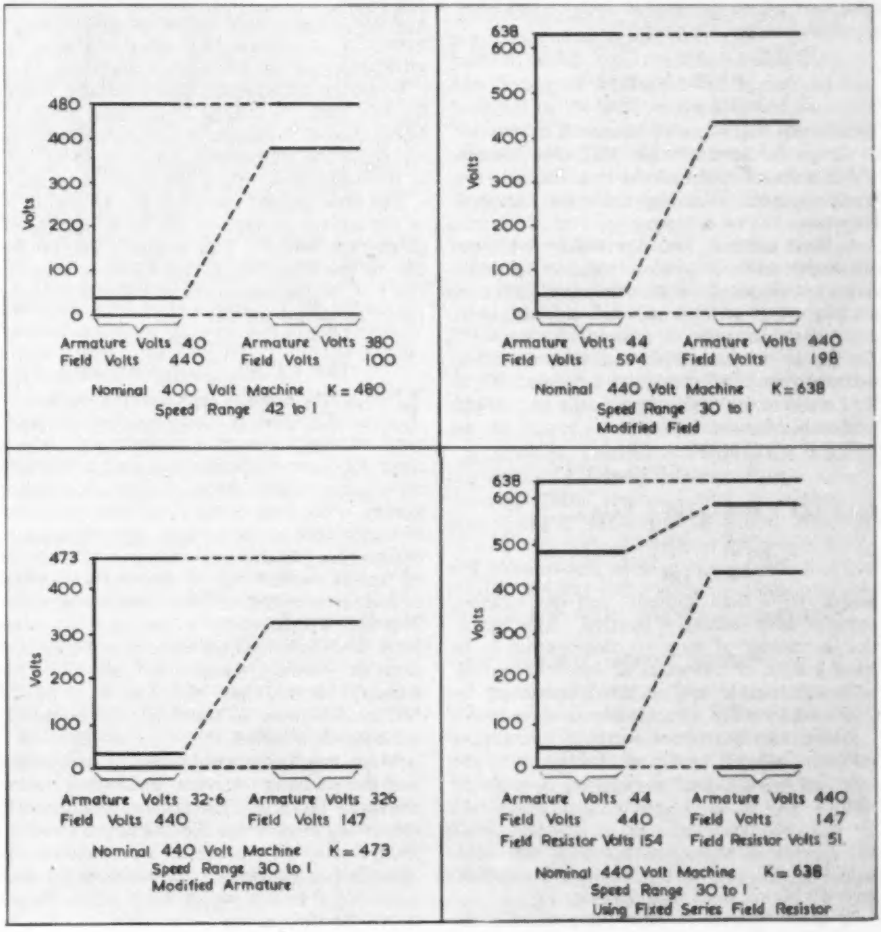
It is possible, however, to arrange useful working combinations, such as follows by way of example for a 400-volt machine. Armature volts 40 and field volts 440 for starting and minimum speed, armature volts 380 and field volts 100 for maximum speed, i.e., making k = 480. It will be seen that this involves applying 110% voltage to the field and since this condition will apply at minimum

speed (when the motor ventilation is also at a minimum) care must be taken to ensure that this does not result in an excessive temperature rise of the field coils. It will also be seen that the final armature voltage is only 95% of full value and this means that the armature current will be 105% of the value it would normally have with 100% armature voltage. However, it seldom happens that a machine is called upon to operate at minimum speed for long continuous periods, and a drive is seldom designed with no motor capacity in hand, so that within such practical limitations as do exist the scheme can still be very usefully applied to many existing drives—the above example providing a speed range of about 42 to 1. (See Fig. 3 for potential diagrams.)

Variants of the System

Let it be assumed that we have a 440-volt motor and that it is required to operate it over a 30 to 1 speed range. This requires a

Figs. 3, 4, 5 and 6 below are scaled potential diagrams, applicable, top left (1) to a 400-volt machine used over a speed range of 42: 1; top right (2) to a 440-volt machine with modified field; bottom left (3) to a 440-volt machine with a modified armature and, bottom right (4) to a 440-volt machine using a fixed series field resistor



variation from 10% armature volts at 100% field, up to 100% armature volts at $33\frac{1}{3}$% field.

Now if we equate the sum of the armature and field volts at minimum speed to their sum at maximum speed, and on the basis that we are prepared to accept a modified field voltage, we have :—

$$44 + 100\%\ EF = 440 + 33\tfrac{1}{3}\%\ EF$$
$$66\tfrac{2}{3}\%\ EF = 396$$
$$100\%\ EF = 594$$

This means that if we are prepared to re-wind an existing machine, or design a proposed machine, to have a field suitable for 594 volts instead of 440 volts we shall be able to obtain the required result. (See Fig. 4 for the potential diagram.)

Or, if we make the same calculation on the basis that we are prepared to accept a modified armature voltage, we have :—

$$10\%\ EA + 440 = 100\%\ EA + 146\tfrac{2}{3}$$
$$90\%\ EA = 293\tfrac{1}{3}$$
$$100\%\ EA = 325\tfrac{25}{75}$$

This means that if we are prepared to re-wind or design the armature for $325\frac{25}{75}$ volts instead of 440 volts we shall again be able to obtain the required result. (See Fig. 5 for the potential diagram.)

A third method, and one which doubtless offers the most convenient solution (since it enables a standard motor with equal field and armature voltage to be correctly applied) is to use a fixed resistor in series with the field. Taking the same example of a 440 volt-motor working from 10% armature volts and 100% field volts to 100% armature volts and $33\frac{1}{3}$% field volts, we now have :—

$$10\%EA + 100\%EF + IFR = 100\%EA + 33\tfrac{1}{3}\%EF + \frac{IFR}{3}$$

$$44 + 440 + IFR = 440 + 146\tfrac{2}{3} + \frac{IFR}{3}$$

$$\tfrac{2}{3}IFR = 102\tfrac{2}{3}$$
$$IFR = 154$$

where IF = field current and R = ohmic value of fixed resistor to be used. This means that a resistor of such an ohmic value as to have a P.D. of 154 volts at full field current will also enable the required result to be obtained. (See Fig. 6 for the potential diagram.)

There are then three ways of adapting a nominal 440-volt motor so that by using the arrangement outlined it becomes possible to obtain the 30 to 1 speed range described : (i) 440-volt armature with a 594-volt field. (ii) 326-volt armature with a 440-volt field. (iii) 440-volt armature with a 440-volt field and a 154-volt fixed field resistor.

It is of interest to note that, whereas the field rectifier carries the field current, the armature rectifier actually carries the armature current less the field current.

If rectifiers are used, there is no question of circulating currents and the above application is somewhat akin to the case where rectifiers of unequal voltage are connected in parallel on the d.c. side, whereupon the voltage of the common d.c. terminals merely become that of the highest voltage rectifier with no resultant circulating current.

It will also be noticed that the armature current cannot be less than the field current and that at minimum armature volts and maximum field volts (for minimum speed) the conditions are closely allied to the case of a shunt motor connected with armature and field in series——a perfectly safe condition even at no load, and one which, while it does not theoretically permit of zero speed, in practice proves quite satisfactory for the purpose as described.

While the arrangement then is suitable where the two currents change from being equal to being unequal it cannot be used where first the current in one load circuit, and then the current in the other load circuit, has to be the greater.

The arrangement described in this article is of the author's invention and is the subject of patent application. The author's thanks are due to the Hackbridge and Hewittic Electric Co. Ltd., for permission to publish the information contained herein.

The I.C.E. Conversazione

FEW of the exhibits shown at the Institution of Civil Engineers' Conversazione last week were of direct electrical interest, and where these did occur, electricity was used principally as a convenient and accurate measuring agency. Yet some of the items were indirectly of importance to the general field of electrical engineering. In this latter category fell a series of studies carried out by the N.P.L. on the estimation of pollution from a factory chimney. This used a scale model (4 ft to the mile) of the local landscape and the factory and chimney. Another model, shown by Mr. C. M. Roberts, showed how the final level of the Mullardoch dam on the Affric hydro-electric scheme was attained.

More directly electrical were the load gauges and the miniature current (hydraulic) meters shown by D.S.I.R. The latter are particularly interesting as they use the change of conductance, due to the passage of a propeller blade between two submerged electrodes, to produce a series of pulses which were timed by an electronic device.

Interconnection with France

Cable Laying Trials to be Carried Out

THIS summer, cable laying trials will take place off the south coast, near Dover, in connection with the proposed project for the cross-channel interchange of electricity.

The P.O. cable-laying ship *Alert* will lay two half-mile lengths of cable of British manufacture, and these will be jointed at sea to a 300-yard length of cable which French manufacturers will provide. After certain electrical tests the cables, joints, etc., will be recovered and returned to works for tests to demonstrate whether and to what extent damage has occurred during the laying operations.

A programme is also being developed in France for a sea trial of two to four sections of gas compression cable, the sections being about 100 yards long. These cables will be laid off a jetty, in deep water, and jointed to form a loop. Tests will include loading cycles and direct current tests.

Investigations will then be undertaken to study the practicability and sensitivity of different methods of locating a gas fault, made artificially at a known point. It may also be possible to test the maintenance of gas pressure and of penetration of sea water into the insulation under fault conditions.

It is expected that the whole of these tests will be completed early in 1954, and coupled with parallel investigation of certain other problems will prepare the way for the submission of a Report on the main project.

General Scheme

The main project, as envisaged by the Joint Committee, set up in 1949, comprises a 132 kV cable circuit, laid approximately between Dover and Calais, and connected into the British 132 kV system on the one side and the French 90 kV and 225 kV systems on the other. The cable circuit would be made up of three single-core cables, with possibly a fourth as spare.

There is at present no installation in the world comparable with the proposed cross-Channel cable, although Canada has a scheme for laying a 69 kV cable 30 miles across the St. Lawrence.

Underground cables of various designs for operation at 132,000 volts and at 225,000 volts are well established and have given satisfactory experience for many years, but the long submarine cable presents its own special design problems; it may be subjected to severe handling when laying, it may be damaged by anchors, joint positions are not accessible for fault location, and repairs are difficult and costly.

Cable Types

The cables to be the subject of investigation are the external gas compression cable and the pre-impregnated gas pressure cable: the former because of its high inherent electric strength and the apparent extra security against damage provided by the two lead sheaths, and the latter because of its simplicity and the possibility of manufacture in long sections.

Attention has been mainly concentrated in this country on the pre-impregnated gas pressure cable, and in particular on the manufacture of sample lengths of suitable armoured cable; of flexible joints with a diameter not exceeding that of the cable proper, and of rigid joints suitable for expeditious repair at sea. These components will be subjected to rigorous mechanical and electrical type tests in the works. In France similar work is being undertaken on two designs of external compression cable and two designs of pre-impregnated pressure cable.

In addition, Electricité de France are to carry out, at their Fontenay Research Centre, severe mechanical and electrical tests on lengths of both types of cable and on joints. Samples of each type of cable, about 125 yards long, will be subjected, while connected direct to the French 225,000 volt system, to long duration stability tests under artificial loading cycles.

Operational Investigations

Frequency control will have an important bearing on the security of operation of the interconnected national systems, and its effect will be assessed from tests on the two systems.

Day-to-day operational information is being exchanged between Electricité de France and the British Electricity Authority in order to study the potential economic exchanges of power and the savings in operational costs which might be effected.

Our readers' views . . .

The Load Factor and Tariffs

I HAVE read with interest the paper on Electricity Supplies for Industry given by Messrs. Johnson & Holder at the recent Power Conference.

It is refreshing to find an official of an Area Board taking so realistic a view of the basis on which an industrial tariff should be designed. Unfortunately he omits one very important point; Area Boards do not recover the whole of their fixed costs by the demand charge alone as is suggested in the paper. No small part of these costs is recovered by means of a hidden element in the unit charge. The reasons for this are well-known but what has been overlooked in all the industrial tariffs published so far is that unless *the whole* of this hidden element is removed from the unit charge at a load factor corresponding to one shift operation (say about 25%) the high load factor consumer, and particularly the continuous process industries, are penalised.

A 2-part tariff consequently does not automatically take care of load factor. There must in addition be a substantial drop in the unit charge at about this load factor. The reason for this is quite clear if we consider two ordinary industrial consumers A and B each working one shift; the tariff is designed so that each of these consumers on the average pay their correct proportion of the Board's fixed charges. If B now decides to increase his output by working three shifts without increasing his maximum demand it is obvious that as his first shift has paid his proper proportion of fixed charges the hidden element must be removed from the unit charge for shifts two and three unless he is to pay more than his fair share of the Board's fixed costs.

G. Rheam
Chief Engineer

ASSOCIATED PORTLAND CEMENT MANUFACTURERS LTD.,
LONDON, S.W.1

• • •

THE article entitled "It is time that the Farmer knew the Facts" is very timely, as I believe that most of the difficulties which are experienced by the Boards in their dealings with the farming community are because they do not speak in language which the farmer can understand. For instance, in asking for a 15 or 20% return on their capital, they do not make it plain that this is a "gross" return, and that the actual profit on the transaction may be less than 5%, or even a loss may be the result. However, most of these troubles arise from the requirement of some Boards to cost each farm connection individually, in which case a farm close to the distribution line obtains a supply on more advantageous terms than another farm a greater distance away, although the Board decides the route of the distribution line. Several of the Boards have overcome this by averaging these costs, or making common charges related to the acreage of the farms to be connected, and these methods are more acceptable to farmers because the burdens are shared.

The Author makes a very important point when he deals with the necessity of the staff engaged on rural development work being fully briefed in rural electrification economics, and having a technical knowledge of the capital and running costs of electrical equipment used on the farm. Mr. Cameron Brown, in his excellent paper read at the recent Convention, makes a strong plea for a comprehensive advisory service to farmers, which could be made to pay by selling and installing electrical wiring and equipment, apart from the increased sales of electricity, and I believe such a service, under the control of an experienced agricultural officer at Area level, should be adopted by all those Boards having rural development problems.

Finally, the Author is to be congratulated on dealing with this problem of rural development in so comprehensive a manner, and I hope it will be studied by all those engaged in this important part of our national development.

W. A. H. Parker

LONDON, W.C.2

• • •

Farm Electrification

THE article appearing under the heading of "It is Time the Farmer knew the Facts" in your issue of June 11, gives some reasons for the farmers' dissatisfaction with rural electrifica-

tions costs. The chief cause is the implied promise made by politicians prior to vesting date that rural supplies would be provided by the electricity boards virtually for nothing, somewhat on the lines of telephone supplies. This is the chief reason for dissatisfaction and one that is not particularly easy to overcome.

E. C. Claydon

EASTBOURNE,
SUSSEX

◆ ◆ ◆

Unit Substations

I WAS very interested to see your report of the paper written by Mr. T. B. Rolls at the Power Convention at Torquay and his reference to the unit substation construction adopted in America and the possibilities it has for economising the Works Distribution Scheme.

I do not know how long this practice has been in being in America, but I applied it in this country to a large factory in 1951; in so doing there has been no increase in the fire risk normal to any factory supply, and we have moreover taken steps to ensure the full economical use of the capacity provided.

The system is undoubtedly capable of considerable development and I think its potentialities worthy of close attention.

Ralph B. Giles

BOURNE END,
BUCKS

◆ ◆ ◆

Commercial Travellers

AS President of the Royal Commercial Travellers' Schools, I would like to make a personal appeal to all readers of THE ELECTRICAL TIMES for most urgently needed financial help to enable the vital work of the Schools to continue. This year we need not only £50,000 for normal current expenditure but also additional funds for essential rebuilding, alterations and repairs, the costs of which are seriously depleting the Schools' capital income.

I am afraid that it is *not* a matter for congratulation that the electrical industry, which has 16 orphan children at the Schools, each requiring £240 per annum to house, clothe, feed and educate, subscribes a mere £600 per annum towards their upkeep. A prosperous and expanding industry could surely do so much better than this.

For this reason I have made myself personally responsible for bringing this deplorable situation to the notice of the electrical industry which, I am sure, will not tolerate it as soon as it is appreciated. Let us all, therefore, in this glorious Coronation year, give immediate practical and generous assistance to the Schools whose gracious Patron is Her Majesty the Queen herself.

Contributions, both large and small, will be gratefully acknowledged by the Secretary, Mr. A. H. Carpenter, whose address is Kings Court, Broadway, London S.W.1, and who, I earnestly hope, will soon be able to tell me that our great industry is at last adequately supporting a splendid organisation which is cherishing and nourishing so many of our own orphans.

Leslie Gamage
President

THE ROYAL COMMERCIAL
TRAVELLERS' SCHOOLS

◆ ◆ ◆

Wiring History

MY attention has been drawn to the article, (part one), published in your journal of June 11, 1953, and written by Mr. J. Mellanby, M.A., A.M.I.E.E., M.Inst.F., with particular regard to the reference on page 1107 to the multiple earthing system used in Egham and Staines.

I am enclosing a copy of the Board of Trade's consent dated April 27, 1911, from which you will see that the statement that "there were individual transformers for each consumer" is not quite correct. It should further be noted that pressure and loading limitations have been considerably extended since the date of this original consent and many installations of this nature are still in service.

Further, a point which may interest Mr. Mellanby is that in connection with a street lighting system, many miles of heavy Stannos have been laid direct in the ground and are still in service, in some cases, after a period of more than 25 years since their original installation.

W. S. Tyrrell
District Engineer

SOUTHERN ELECTRICITY BOARD,
STAINES DISTRICT

The Consent which Mr. Tyrrell mentions applies to a system giving "A high pressure alternating single phase supply to transformers placed in some cases on consumers' premises or in street boxes, but mainly in substations.

"From the transformers distributing mains will be laid for single-phase alternating current supply at low pressure, on the three-wire system. The pressure between the adjacent conductors will be 100 *volts . . . a distributing main will not be used for the transmission of more than 10 kW."*

Electrical Contractors at Bournemouth

E.C.A. PRESIDENT ATTACKS A HIRE-PURCHASE POLICY

The E.C.A. President
Mr. W. T. TRACE

THE general relationship between the Electrical Contractors' Association and the British Electricity Authority has not been as satisfactory as the E.C.A. would wish. Certain meetings have been held during the past twelve months which have been somewhat contentious in character.

This is the judgment of Mr. W. T. Trace, as expressed in his Presidential Address to the Association's Annual Conference, which was held at Bournemouth on Monday, Tuesday and Wednesday of this week. He went on to say that he sincerely hopes that as a result of negotiations at present in progress, a better understanding will be reached.

Hire Purchase Terms

One particular matter which concerns the Association is that the electrical contractor and retailer "has to a large extent to forfeit the sale of electrical merchandise on hire purchase terms. Hire purchase facilities in respect of almost all electrical merchandise are offered by the area boards of the British Electricity Authority with which the private trader cannot possibly compete." Another allegation is that in certain cases areas boards are offering electrical equipment at lower than the manufacturer's declared list prices, although this equipment appears neither shop-soiled nor obsolete.

In spite of such happenings, happy relationships have in many cases ensued from the work of the Co-operation Committees which consists of area board and E.C.A. representatives. Mr. Trace feels, however, that there might be an extension of the activities of such committees in the direction of "real" co-operation, instead of merely using them (very valuably) for thrashing out complaints.

Purchase Tax

Another subject of concern on which Mr. Trace was outspoken concerns purchase tax. Its reduction is welcomed as a step in the right direction, but the retention of the arrangement whereby the retailer loses if purchase tax is reduced is condemned. Since accurate records of purchase-tax collected are kept by every licensed company (wholesaler or retailer) it should be a simple matter to credit the value of any reduction in purchase-tax to the retailer concerned for, say, a fixed period of time prior to the budget. As matters stand, retailers will be forced to reduce stocks to a minimum next year between Christmas and the Budget.

When purchase tax was first instituted a promise was extended to retailers, in the name of the Government, that in consideration of their foregoing any increase in the price of their then existing stock (purchased before the imposition of purchase tax) an equitable rebate scheme would be introduced when the Government abolished, or reduced, purchase tax. "It is indeed strange that the Hutton Committee, being effectively reminded of this undertaking, . . . did not in any way refer to it in the report which it issued."

Discounts

Yet a third subject of complaint in Mr. Trace's address concerned the trading structure of the electrical industry. In his view, the industry has to admit to a considerable measure of failure in its work on discounts for industrial concerns who are buyers of electrical merchandise. The number of industrial and other users quite unconnected with the electrical industry who are receiving a discount on their electrical requirements, equal to that of the electrical contractor and retailer, makes a farce of the term "trade discount." "I am quite convinced," said Mr. Trace, "that the time is overdue when some really spectacular review of the trading structure of the electrical industry is vitally necessary."

Speaking of the E.T.U., Mr. Trace recalled that application for a 40-hour working week has been threatened. Yet it is doubtful if even a 44-hour week can be afforded. Output per man hour is the real solution in the electrical industry as in many others, to increasing the

buying power of the wage packet. The President urged the National Federated Electrical Association, in its negotiations with the Electrical Trades Union, to set an example in this direction which may be followed by the industry of our country as a whole.

Finally, on the subject of registration. It has been said on many occasions that compulsory registration is almost impossible of achievement: but no one seems willing to say that it is undesirable. Proposals for voluntary registration have been further examined, but it is of some significance to note that each of the three interests in the electrical contracting industry have made it clear beyond any measure of doubt that in the light of their unique experience, they are satisfied that nothing which does not possess a proper element of statutory control will have the desired effect.

Contracting in a Buyers' Market

NO-ONE under the age of 35 knows very much about competitive selling and buying as it existed before the war. Vital elements in commercial life have to be taught anew, and many must relearn what they have tended to forget. These considerations provide a topical background for a paper "Some Commercial Aspects of Electrical Contracting and Retailing," which Mr. J. Mortimer Hawkins presented to the Conference on Tuesday morning.

In Mr. Hawkins' view, it is time electrical contractors tried to reorientate themselves, surrendering moral ascendancy to their clients, while claiming it over their own suppliers. Electricity Boards are suppliers whose products must be effectively employed in the installations carried out. It has to be remembered that clients are unable to use much judgment themselves, and they must rely on advice given by contractors.

In particular, contractors must effectively interpose themselves between clients and area boards, and to do this they must have a working knowledge of the relevant Acts of Parliament and of the necessary procedures. Informed help should be given both to board and to client, and both may be saved expense in this way: unless this is achieved, the future existence of contractors is in jeopardy.

Manufacturers and wholesalers should be pressed to state unequivocally whom they regard as their customer, the contractor or the user. "Clarification is urgently needed as to how far and for how long our industry is to be saddled with a discount-snatching procedure blessed with the name of *Policy*". One suggested alteration is that the "recognised user" for discount purposes should be required to employ three staff journeymen and their assistants regularly at a stated address. The Fair Trading Council could issue certificates to such concerns, and the number of the certificate should have to be stated in order to claim discount privileges.

It may be thought that there is sometimes an over-anxiety on the part of the supplier to secure business while overlooking his own long-term interests and the more immediate interests of his customers in the trade. On the other hand, there are probably some shortcomings in the electrical contractor's contribution to business development. Some of the procedures followed could well be critically examined.

The contractor himself should avoid giving his client manufacturer's plans and proposals for a scheme unless the client is clearly told—this is how the XYZ Company propose that their products should be used. If the client is told—this is the XYZ Company's scheme—an element of dishonesty is involved, and in addition future enquiries may go direct to the company concerned.

Service to Client

Finally, the client. Is it enough to offer a service in general terms limited to 44 hours out of 168 each week? This and other questions suggest the answer that it might be possible for four or six like-minded contractors in a given area to get together so as to give a more effective and attractive service to the public, though without any formal joint financial structure.

Such an arrangement would enable a 24-hour service to be given without undue strain on any one business. Specialisation might be practised by individual firms in the co-operating group. Finally, staff training and organisation, and the development of efficient methods, would be facilitated. One final advantage is the probably greater security in connection with the effect of Estate Duty.

In a final brief reference to electrical retailing, Mr. Hawkins emphasises that the good retailer sells warmth first, and supplies heaters as the circumstances demand. He sells hot water, not electric geysers. Shops, showrooms and display windows should be arranged with this in view, and then customers would be more ready to buy.

ELECTRONICS—*an opportunity to be seized*

WILL the electrical contractor's failure to seize the opportunity that radio offered be repeated in the case of electronic apparatus? Thirty years after this lost chance, a new industry is striving to establish contact with the public, and electrical contractors, particularly those carrying out work of an industrial character, have an opportunity to add a lucrative sideline to their business, forestall a competitor—and prevent history being repeated.

Some considerations which will affect success or failure are set out in a paper by Mr. W. H. SMITH, O.B.E., "Electronics and the Contractor," which was presented to the Conference yesterday afternoon. In general, electronic equipment of the type considered is not sold in quantity to individuals. Each sale at the present stage of development involves some technical discussion with prospective customers, and these are usually sceptical of advertising and literature on the subject. A personal approach is essential, and is a protracted and often expensive business.

There is a past to live down here, for misguided enthusiasm immediately after the war led to unsuitable applications of electronic apparatus, and to a consequent stigma of unreliability. Sound technical knowledge and prudent salesmanship are now essential.

Opportunity for the contractor exists in his close knowledge of the processes which his customers have to carry out. If he is well informed, the contractor will be able to suggest where the use of electronic equipment will be beneficial. Moreover, he will be able to do this at a relatively low selling cost.

Such an opportunity, if seized, will not stop with the electronic equipment alone, for that is rarely complete by itself. Associated mechanical and electrical plant may become profitably involved.

Ground Work

As already mentioned, some long term ground work must be put in to convince prospective users of the reliability of electronic equipment, and contractors should lose no opportunity of emphasising this. A possible approach is to stress that the basic components are all manufactured by firms of repute to close limits, and that they have a known life when correctly applied.

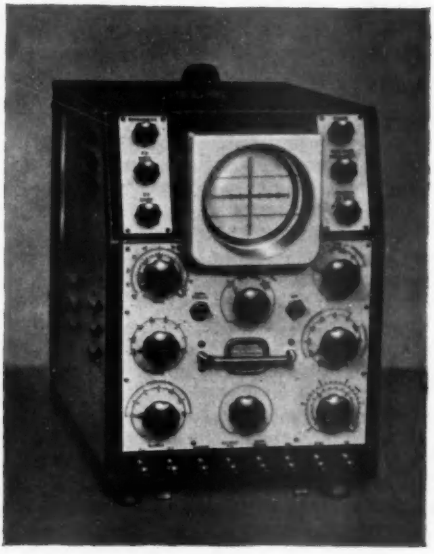
Servicing of electronic equipment should be preventative in character. There should be periodic routine inspection, cleaning and performance tests, with the emission characteristics of valves watched for an indication that replacement is advisable. Maintenance of such plant cannot be directly very profitable, but it is potentially valuable as a good-will builder.

In his paper, Mr. Smith gives a review of some typical items of electronic equipment which the contractor might handle. In general, he feels that contractors will find manufacturers of control gear and apparatus quite prepared to discuss the application of their products and to give advice on associated equipment. Above all, however, this new field of development belongs to the young man, and a firm may well benefit from providing training for the right man who has completed his normal apprenticeship.

High frequency heating is well established, both in its induction and dielectric forms. Electronic control of motors has many advantages, but it will not abolish the use of Ward-Leonard equipment.

Voltage regulators of various types are becoming increasingly important as consuming devices of increased efficiency are marketed, and there is application for them from laboratory to workshop. Another instrument with a rapidly-widening field of application for examining rotating or oscillating machines is the stroboscope.

A modern universal instrument is the Cossor double beam oscillograph 1049



WIRING — *Yesterday, today and tomorrow*

Past developments and future prospects are reviewed in this article by **J. MELLANBY, M.A., A.M.I.E.E., M.Inst.F.**

PART TWO

HAVING surveyed the foundations of electric wiring history in part 1 of this article, we may now proceed to an examination of developments since 1920 under the three heads of:—(1). Rigid metal enclosed systems. (2). Flexible systems. (3). Special systems.

Rigid metal enclosed systems started from the screwed conduit system, and now include bus-bar systems, cable trunking or troughing and metal under-floor rectangular ducts, and an installation, particularly in a large building may include some or all of these. The early conduit installations showed much inherited gas fitting practice, practically all the branches being made by tees. From about 1926 however, the development of new fittings was greatly accelerated and the lay-out of jobs began to change. The use of the multiple back-outlet or looping box was an important factor in the emancipation from the gas fitters, though changes in building practice had much to do with its introduction. When practically all floors consisted of boards on wood joists, it was possible to leave traps over inspection tees wherever required, at the cost of some inconvenience to the carpenters. Solid reinforced concrete or "pot" floors, were, however, another matter, and the provision of traps in granolithic, parquet or other special surfaces was frowned on by architects. Moreover in this type of floor the best place for the conduits lies in the top screed. The original inventor of the looping box will probably never be known, as before these fittings were placed on the market, quite a number of contractors had the idea and made them by taking terminal boxes, plugging the end and drilling holes in the back.

Bending Conduit

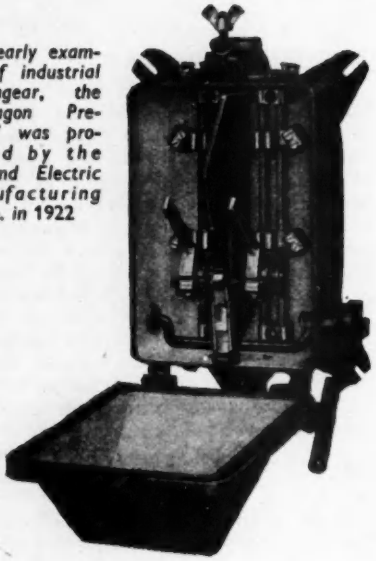
Although the mild steel used in conduit makes for easy bending, it was a long time before this property was fully exploited, although some of the older books on wiring state that most remarkable bends can be made both in light gauge close joint and heavy gauge "by hand" in the smaller sizes. While the author will not go so far as to say that this is impossible, he has never been able to do it himself, neither has he seen it done. Although simple bending machines were available, few contractors made use of them, and most jobs either used purchased fittings for right angles, or bends of quite large radius made with the aid of a piece of wood with a hole in it commonly termed a "setting block." The Americans developed a device about midway between the setting block and an actual machine, commonly referred to as a "hickey," but this never became popular in Britain. The reluctance to use bending machines arose from both an aversion on the part of employers to incur more capital expense and on the part of workmen to adopt a new procedure which was likely to reduce the amount of labour required on a job. However, for the satisfactory installation of looping boxes in floors of average thickness the production of bends of moderate and uniform radius is essential to good and rapid work.

Too Many Fittings

These improvements in conduit erection require an ever growing number of varieties of fitting, which becomes an embarrassment to manufacturers, wholesalers and contractors alike. There are, for example 19 different small B.S.S. circular boxes in each of $\frac{3}{8}$ in., $\frac{3}{4}$ in. and 1 in. sizes, and further types can easily be visualised. There is an American skeleton box with detachable spouts which can be assembled in a dozen or so different ways, but this has not appeared in Britain, neither does there appear to have been any attempt to solve the problem by knockouts. However, perusal of any manufacturer's list of conduit fittings indicates that there should be considerable scope to a drastic attempt to reduce the number of types available, without sacrificing anything of efficiency or convenience in the resulting installations.

While the use of conduit is most convenient for the protection of the smaller sizes of cable,

as it gets larger it becomes expensive and more awkward. For currents of 100 amperes and over it compares unfavourably with paper insulated cable, but an even better alternative is formed by the various types of enclosed bus bar systems available. These have the further advantage that they make use of bare conductors, suitably protected, so that tappings may be made at any point without jointing or disturbing insulation. Where a large number of small cables have to be taken along the same route, metal trunking, instead of multiple tube runs is a great advantage. A special problem arises in large modern buildings, where the division of large floor areas into rooms may not be decided upon until the construction is completed, and changes may be required afterwards. A most ingenious solution was first introduced by Higgins and Cattle about 1930, comprising a "grid" of rectangular steel tubes laid in the screed of the floor, and connecting with a widely spaced system of rectangular junction boxes. The tubes were often laid in sets of three, for lighting, power and communications circuits, while a system of separators in the boxes maintained complete metallic separation between the three types of conductor. The position of the ducts was accurately recorded on the floor surface, and by a simple tool, access could be made into them anywhere along their length. Similarly unwanted outlets could be neatly plugged. By this means it was possible to provide "standpipe" connections in offices, etc, practically anywhere required, and surface work was minimised.



This early example of industrial switchgear, the "Paragon Premier" was produced by the Midland Electric Manufacturing Co. in 1922

Away from Steel

The steel shortage occasioned by World War II caused conduits and fittings to be produced in aluminium alloy. While the strength of the metal is inferior to steel, it gives a high degree of mechanical protection. and its freedom from rusting is advantageous in tropical atmospheres of high humidity. Copper conduits have also been used to a small extent with brass or bronze fittings for damp situations. Connections were made by a capillary soldered joint, as is used in plumbing practice. The scarcity and cost of the non-ferrous metals due to World War II has caused its virtual disappearance. Various plastic materials have also been successfully used for the manufacture of conduit, and these will be mentioned more fully later.

However, the most recent development in rigid enclosed systems is one which provides practically all of the advantages of conduit (plus some additional advantages), without using any tube at all! In the Ductube system, which is specially applicable to buildings with reinforced concrete or "pot" floors, a special rubber tubing is laid in the position where the cable ducts are required before the concrete is poured. In order to popularise the system it seems that what is really required is a simple and inexpensive form of universal box, incorporating an earth terminal to which may be attached an earth conductor, drawn in with the cables, when this feature is needed. The ducts formed by this method will normally be larger than the bore of the conduit they replace, so any difficulty in drawing in due to roughness will be more than counterbalanced by the extra space available. It seems that some of the new plastic insulations may be better than rubber for use with this system. In any case the system should have a great future once it receives a special mention in the I.E.E. Regulations and its fittings and ancillary equipment are covered by the appropriate British Standard Specifications.

Flexible Systems

Turning to the development of flexible systems during this period we find a great variety of cables and accessories. It has already been mentioned that the first "lead covered" system was introduced in 1911. This actually had a sheathing of a lead alloy containing antimony, and bonding depended on the use of clamps provided in the junction boxes, etc., or rather

on whether these were used in a careful manner. In order to facilitate bonding, a bare conductor was later added under the sheath, and earth terminals provided in the junction boxes. While the boxes specially designed for these wiring systems were light metal pressings, some makers advocated the use of standard screwed conduit boxes, with nipples or glands screwed into the outlets. Some of these were very ingenious and provided efficient bonding combined with water-tightness and good mechanical strength, but they were more costly than the normal fitting and only had a limited application in special situations. Messrs W. T. Glover's "Glo-Clad" system, which employed special lead-covered cables of circular section is one of the best known examples.

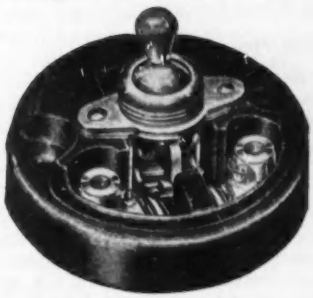
Rubber Insulation

From the earliest days, cables were insulated with a layer of pure rubber, followed by one of vulcanized rubber, over which the protection or sheathing was applied. The original criterion of the insulating material was its ohmic resistance, and for many years three grades of cable were marketed by the members of the Cable Makers' Association, 2,500 Megohm (per mile) "Association;" 600 Megohm "Association" and 600 Megohm "Non-Association." Experience showed that high resistance did not necessarily give a cable with the longest life or the best mechanical properties, and the specifications were progressively modified and simplified until now rubber insulated cables are produced in two grades only, 250 and 660 volt. While rubber has, in general, proved to be a very satisfactory insulating material it is liable to "perish," and this process may become rapid under high temperatures and direct sunlight, so there has been a constant search both for improved methods of processing and for alternatives. In 1920 the Macintosh Cable Co., produced their "Maconite" version of the t.r.s. system first introduced by the St. Helens Cable Co., under the designation "cab tyre sheathed," in which the layer of pure rubber was omitted, and insulation and sheathing was combined in a compounded rubber of their patented specification. Since it was not possible to use coloured cores for identification purposes, external ribbing was adopted. Twin and 3-core cables were made in flat form with a web between the conductors, and it was at first recommended that fixing be carried out by driving pins through these webs. However, this did not prove satisfactory and it was soon forbidden by the I.E.E. Regulations. Wood channelling was used to provide additional protection and to enhance the appearance of surface installation, and numerous plastic fittings were developed.

Synthetics

World War II, with its shortage of natural rubber gave a great impetus to the development of plastic insulations, and now two materials are in regular manufacture either wholly or partly replacing rubber as insulation or protective sheathing—p.v.c. (poly-vinyl chloride) and Polythene (polyethylene). Over 30 years of experience have now shown conclusively that the t.r.s. type of all-insulated wiring system has much to recommend it, and that it has come to stay. However, continuous developments in cables may be expected, and it may safely be said that natural rubber is by no means "finished" yet, while plastics are, comparatively speaking, still in their infancy.

Plastic tubing, together with associated fittings as an alternative to metal conduit has also been developed, which results in a system which may be considered to be midway between a rigid conduit system and a flexible



An early quick make-and-break switch which gained great popularity in the period immediately after the First World War

system. By using cables with plastic insulation, which have smaller dimensions than the corresponding rubber ones, small tubes and a most compact job can be achieved. Compared with a metal conduit job, the mechanical protection is less, though very often adequate, while resistance to chemical corrosion may be much greater. As compared with a t.r.s. system, single conductors and "looping" may be employed, so the number of joints will be less, and the cost may be slightly lower. The system has definite advantages and some powerful protagonists; time alone will show what part it is to play.

It has already been mentioned that impregnated paper was used in the "Kalkos" system many years ago, but the first really revolution-

ary change from rubber was provided by the "Pyrotenax" system introduced about 1930. This comprises solid (not stranded) bare copper conductors embedded in powdered magnesia and surrounded by a solid drawn copper tube, thus giving a system which is almost indestructible. The insulation is hygroscopic and the ends must be sealed, but, unlike paper, it can become wet and be dried out repeatedly without harmful effects, merely by the application of a blowlamp. This is undoubtedly the ideal system so far produced for high temperatures and really arduous conditions, it is simple to install and if reasonable care is taken to seal the ends and prevent the ingress of moisture, success is assured.

Other developments in insulation produced especially to stand up to high temperatures, are varnished cambric, which is now greatly used for ship work, and silicone rubber. The latter uses chemical compounds which resemble normal organic compounds, but the carbon has been replaced by silicon; many applications are being found for these substances, such as really high temperature lubricants, and fluids for use in heat exchangers, etc.

Accessories

The success of any system, whether rigid or flexible, earthed or insulated, depends on the accessories used with it. Some mention has already been made of early developments in this field, more recent ones will now be considered. The stone link tumbler switch reigned supreme until 1919 when Crabtree introduced the first quick make and break movement; the same firm made an "all insulated" switch with porcelain cover and dolly in 1922, and the modern type of plastic switch dates from 1928. While ironclad switches and fuses were in general use for medium and large installations for a long time, the first serious challenge to the use of coupled tumbler switches and bow cut-outs in small houses came in 1927, when a miniature switch fuse was marketed by the Foster Engineering Co., under the name of "Wee Apex". Other manufacturers soon followed with similar productions. A very great deal of trouble was caused by the lack of a standard for plugs and sockets, and each manufacturer chose spacing and diameter of pins to suit his own convenience. Two-pin sockets were first treated by the B.E.S.A. as late as 1927, and finally codified in 1930. 3-pin sockets had to wait until 1934.

Of more recent developments, the most useful is that of the 13 amp plug and socket in the "ring main" system, which should provide greater convenience in installations at less cost. There is, however, a demand from the public for switched sockets for use with this, especially for use with electric fires. The virtual disappearance of d.c. supplies has also rendered the quick make and break switch unnecessary, and further advances in a.c. switches may be expected. One problem the solution of which is still far off, is that of the respective merits of re-wireable fuses, cartridge fuses, or automatic cutouts, and also of single versus double pole control.

Among what may be called "special" systems, only one will be mentioned, the "grid suspension" method of Enfield. Here a steel tension wire is made up in a multicore cable along with the conductors, and is used for straining it tight over long spans. It can be used both indoors and out, for street lighting and connections to machines, or lights in large factory bays.

Conclusions

Of the main systems so far described, the following comments will be made.

Screwed Conduit. Still the best for many purposes, but the number and variety of accessories must be drastically reduced, by the introduction of multi-purpose fittings, more "knock-outs," etc. Associated with it there will always be a need for bus bars, cable trunking, etc., but the larger sizes might well be abandoned.

T.R.S. This system has lived up to nearly everything prophesied for it by Prof. Parker Smith 30 years ago, and the various manufacturers of cables and accessories can be relied on to produce new, better and more economical material.

Non-Metallic Conduit systems. Here future trends are not nearly so clear, perhaps, because it is an intermediate system between the two described above.

Special Systems, such as Pyrotenax and Grid Suspension. These have most definite, though perhaps limited applications, and have useful functions to fulfill.

Light Gauge Slip Conduit, and Lead Covered. Both these systems could be abandoned immediately, as they now have no functions which are not fulfilled better by other systems. T.R.S. is more resistant to mechanical and chemical damage than the lead alloy sheath, and an earth conductor provides better and more certain continuity at lower cost. T.R.S. is also much better for domestic work than slip conduit, it is quicker, cheaper and more adaptable to alterations and extensions. For concealed work in concrete floors the Ductube system, which eliminates tubing altogether, has many advantages.

NOTES ON WIRING by Megohm

Concrete and Conduit

A CORRESPONDENT writes to tell me that he has read with interest that t.r.s. and p.v.c. sheathed cables have and are being buried direct in floor screeds and walls. This correspondent says that the introduction of pneumatic tubes for forming conduits in concrete to receive circuit wiring has considerably reduced the cost of providing conduit systems in buildings, and I gather that in his opinion the saving effected by this system shows there is little justification for burying cables direct in floors and walls.

The method of forming conduits in concrete floors and walls of a circular bore is by using tough rubber pneumatic tubes which are laid and inflated in position before the concrete is poured. The pneumatic tubes can be easily withdrawn when deflated after the concrete has set, and if reasonable care is taken can be used many times before their useful life is ended. The system follows the general lines of a "loop-in" steel conduit system and purpose made concrete "loop-in" boxes are available for termination points at ceiling outlets. In cases where lightly constructed partition walls are erected, the down drops to the switch boxes can be extended by using either insulated or metal conduits. It is recommended and desirable to use p.v.c. insulated cables in preference to v.r.i. cables when wiring the concrete formed conduits in view of the possibility of moisture being present in the concrete during its early life.

Mr. T. C. Gilbert in a letter published in the ELECTRICAL TIMES of May 7 says his experience has been that to a large extent the practice of burying t.r.s. and plastic sheathed cables directly in concrete floors, etc., is now being abandoned mainly on the grounds that damage to the insulation of the cables during building operations has resulted in early breakdown of the installed wiring system. Mr. Gilbert advocates the use of a flexible non-metallic conduit system, again using p.v.c. insulated cables for the circuit wiring, adding that this method retains the advantages of a draw-in system costing little more, if any, than that of an insulated sheathed flexible cable system.

Now here are two of a number of viewpoints on wiring methods in use today. In the first case circular bores formed in concrete by the use of pneumatic tubes are claimed to show substantial savings against a steel conduit system. In the latter case, a flexible non-metallic conduit system, although more expensive than steel conduit, it is claimed that the enormous saving in labour on installation work offsets this cost and makes the completed installation comparable with costs for directly buried t.r.s. and p.v.c. cable installations.

Flexible Sheathed Cables

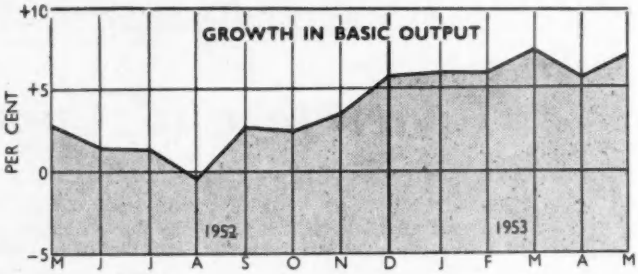
It is a little difficult to follow how labour saving may be effected by using one or the other of these two systems against the labour cost of laying a flexible sheathed cable system direct into floor screeds and walls. I venture to suggest it is not unreasonable to assume that the time taken to install either a pneumatic tube or a non-metallic conduit system will not be less than the time taken to install a flexible cable system. Whilst the wiring for either of these conduit systems may not take a long time nevertheless this is an operation that is cut out when using an insulated flexible sheathed cable system laid direct in the building structure, and therefore such a system must surely show a labour saving over either of the foregoing conduit systems.

No views have been expressed on laying mineral insulated copper sheathed cables direct in concrete floors, brickwork, etc., without further protection. Here is a cable whose thin copper sheath is more easily damaged than the resilient sheath of t.r.s. or p.v.c. sheathed cable. Mineral insulated copper sheathed cables are now being more extensively concealed in building structures without further mechanical protection than ever before and it appears that the feature of providing "drawing-in" facilities which in the past have been so strenuously advocated is today not so highly rated and in the future may recede into oblivion.

There is little doubt that it is essential, if we are to make progress, we must produce new and better wiring methods and we should scrap old wasteful systems to help to reduce the cost of wiring work and so enable many more outlet points to be installed for the consumer's use without increasing the cost of installations.

BASIC LOAD GROWTH

In the accompanying curve is shown how energy sold by the B.E.A. in the past 12 months compares with that of the corresponding month a year earlier. Figures used for plotting are first corrected for the effects of temperature and of the number of working days included in the calendar month. Thus the points marked are an approximate measure of the basic rate of load growth experienced by the B.E.A.



Power Supply in May

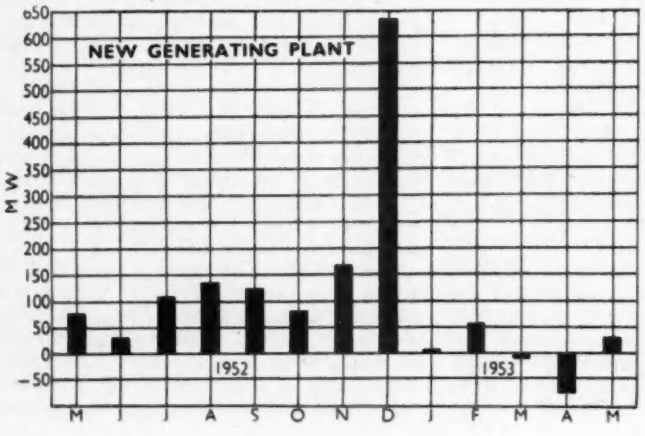
TOGETHER with four boilers, the B.E.A. commissioned one set last month, the second so far this year. This, the third 32 MW set at Rye House, Eastern Division, is of Richardsons Westgarth-Parsons manufacture, generating at 33 kV, and is designed for t.s.v. steam conditions of 600 lb/sq. in. at 850° F.

Of the four boilers, two are being commissioned at one station—East Yelland (in the South Western Division). Both are John Thompson units, rated at a steam capacity of 180 k lb/hr, and their commissioning marks the first plant recorded for this station. They are to power Parsons 31·5 MW turbo-alternators. In the Midland Division, Nechells "B" increased its commissioned steam plant by a 230 k lb/hr International Combustion unit, of which the total there is now eight. Steam is supplied to the 52·5 MW Parsons sets at t.s.u. conditions of 650 lb/sq. in., 825° F. To complete last month's total is a 300 k lb/hr unit, by Babcock and Wilcox for the Manchester and North Wales Division at Bromborough. Here standard steam conditions at the turbine stop valve are used, 900 lb/sq. in., 900° F., for the 50 MW English Electric hydrogen cooled sets.

Sales

As in April, there was a heartening increase in the energy sold last month by Area Boards. The national figure of 4,404 million units for the month is 5·4% above that for May 1952, and, when corrected for temperature and working days is 7%. This figure, the basic load growth experienced by the Authority, is the second highest for the last 12 months and reflects the healthier position of the supply industry.

With the exception of one, all Area Boards recorded an increase in sales, despite the fewer

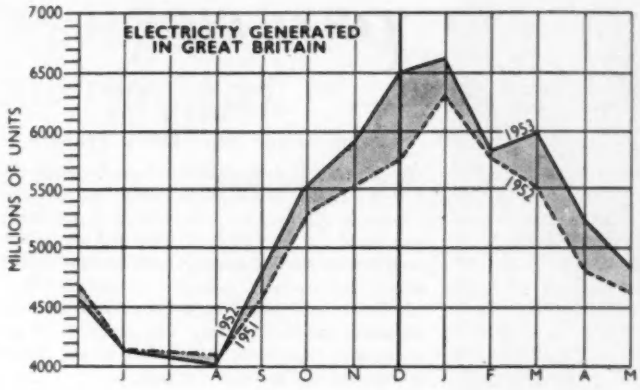


GENERATING PLANT

At the end of May, 1953, the installed capacity of the B.E.A. was 17,183 MW, showing an increase of 32 MW during the month. During the same period that of the North of Scotland H.E. Board also rose, by 1 MW.

The overall increase during the past twelve months is 1,210 MW or 7·3% of the total at May 31, 1952.

The total installed capacity used for the purposes of this graph is the total m.c.r. of all generating sets which are connected on both steam (if appropriate) and electric sides and are suitable for service.



UNITS GENERATED

Total generation during May amounted to 4,856 million units in stations under the control of the British Electricity Authority and the North of Scotland Hydro-Electric Board. Last year's corresponding figure was 4,584 million units.

Of May's total, 4,770 million units were generated in steam stations, whilst the contribution from hydro-electric stations was 75 million units.

Energy sent out by both Authorities during the month totalled 4,560 million units. 94% of that generated.

number of effective working days compared with 1952. Temperatures for the month were slightly lower, (54·7° F as against 56·2° F), which probably accounts for the generally higher percentage increases experienced by those Boards whose consumers are predominantly non-industrial. Most of the increases less than 5% were shown by Boards supplying consumers more than half of whom are industrial and who would therefore indicate to a greater extent the fewer working days.

In contrast to the last two months, an increase in capacity of the Authority's generating plant available for service is recorded. Of the 17,742 MW total, 17,183 MW is operated by the authority and 559 MW by the North of Scotland H-E. Board, the latter figure being an increase of 1 MW over last month's total.

Power station coal stocks rose during the month from 4·35 million tons to 4·74 million tons, the average being 4·56 million tons compared with last year's total 5·71 million tons. Consumption has been running at an average of 641 thousand tons/week, whereas last year this was 604 thousand tons.

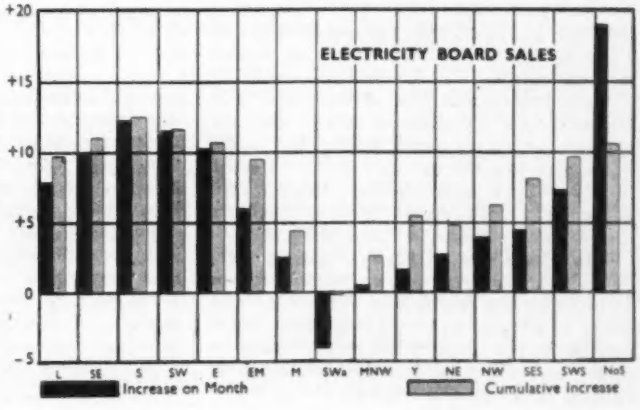
B.E.A. SALES TO AREA BOARDS IN MAY

Board	May total in million units	% inc. or dec. on May 1952
London	389·1	+7·9
South Eastern ...	236·6	+9·9
Southern	283·7	+12·2
South Western ...	138·6	+11·6
Eastern	393·9	+10·2
East Midlands ...	345·9	+6·0
Midlands	462·3	+2·5
South Wales	264·1	—4·0
Merseyside and N.W.	260·2	+0·5
Yorkshire	448·6	+1·6
North Eastern ...	279·3	+2·6
North Western ...	500·7	+3·9
South-East Scotland...	93·3	+4·5
South-West Scotland	230·0	+7·3
Direct Sales	77·5	+30·7
Grand Total ...	4,403·8	+5·4

MAY SALES

Progress in the sales of energy by the British Electricity Area Boards and by the North of Scotland H.-E. Board are represented in this diagram. For each entry the two columns indicate, respectively: the bulk supply of electricity taken by the Board (or the total sent out to Areas for the North of Scotland) in May, 1953, expressed as a percentage increase on that in May, 1952; and at the same comparison for cumulative totals based on the financial year.

It should be noted that the B.E.A. financial year runs from April 1, whilst that of the North of Scotland H.E. Board corresponds to the calendar year.



PROBLEMS AND PRACTICE in Engineering

On Choosing the Contactor

A LARGE proportion of the troubles experienced with starter gear can be traced to the choice of unsuitable types of equipment. Too often the designer of a machine lists the electrical effects he desires and submits the list to a switchgear firm. A scheme is then drawn up and the parts are sent on. All this is done without the electrical designer being fully aware of the severity of the service to be met with during the machine's period of production.

For instance, one expensive machine is sent out with an 'inching' button as 'run' trials must be made at frequent intervals. It is very important that this push operates properly as the man on the job gets so used to the motor stopping when the push is released that it is possible for him to trap his hands.

It has happened that a machine has run on due to welding of the surfaces of the contacts. The contactor supplied is built into a box on the machine frame and is of the tiny air-break type. With repeated 'inching' the possibility of contact welding is considerable.

Obviously a more robust form of contactor is advisable and the contact surfaces should be such as will not melt together. A carbon-metal combination is a satisfactory answer for such an application.

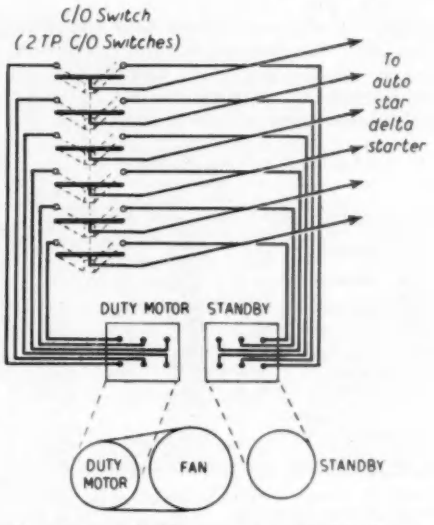
The writer came across a highly dangerous set-up recently. A conveyor was fitted with a very well-known hand-operated direct-on-line type of starter. This switch had a no-volt coil, and stop buttons were connected in the circuit. At the remote end of the conveyor a porter noticed that a faulty tray was approaching and a jam-up was likely. Accordingly he pressed his stop-button.

Unfortunately the man at the 'feed' end misunderstood the stopping of the conveyor and switched on the starter, holding the handle in the hope that shortly it would stay up in the 'on' position. Meantime the conveyor kept going and a costly smash resulted. Another case of good starter and wrong application.

Where there is no possibility of direct contact between the workers at the ends of a conveyor an ordinary stop button is of little value. It is better to provide an on-off single-pole switch and better still to carry the mains through a three-phase switch so that the supply can be isolated positively.—*W. H. A.*

Change-over Star/Delta Motors

A RECENT complaint of fuses blowing on a large 3-phase fan motor led to the following disclosures. The motor in question was wired for star/delta starting and a standby motor was also provided, both motors being wired to a six-pole, change-over switch which consisted of two triple-pole, change-over switches linked together. The starter was an automatic star/delta type, the wiring from which was as shown in the sketch.



Connections of change-over switch for the two motors

It was reported that whenever the motors were changed over the circuit fuses blew. The cause was soon apparent; when the change-over switch was operated, the delta contacts remained made in the automatic starter and the motor being brought into duty was in effect attempting to start "direct-on-line."

A recommendation was made to provide extra contacts in the change-over switch and wired back to the line contactor coil on the starter, so that whenever the switch was operated the contacts on the starter would drop away, ensuring the correct starting sequence for the incoming motor.—*S. Arnold.*

25 JUNE, 1953

European Hydro-Resources

U.N. Report Increases Previous Estimates

OFFICIAL estimates of the hydro-electric resources of a group of thirteen* continental European countries suggest that in the foreseeable future some 244×10^9 kWh of electrical energy might be economically generated every year. A new study by the U.N. Economic Commission in Europe now claims that this aggregate "economic potential" is incomplete, and that it could probably be increased by about 20%—say 50×10^9 kWh.

The report, like so many that deal with hydro-electricity, is concerned at the lack of hydrological data available. This is so because surveys, costly and time-consuming as they are, tend always to stop at physical and cost limits which go little beyond immediate expectations of use. Moreover, there is uncertainty about how these various limits are to be defined, and as a region is increasingly developed, discrepancies from this cause assume importance.

Definitions of Potential

Definitions of three levels of potential are suggested in the present report. The first of these is the gross potential power of the head and flow of water physically available in an average year. This sets an absolute limit to development, and could be realised only in virgin country, with the electricity interests having first choice of sites.

Technical potential is the second level, and being more restricted it has greater significance. In estimating technical potential, account is taken of such factors as diversions of water for irrigation, the efficiency of the turbo-alternators and the loss of head in the hydraulic system feeding them.

Finally comes economic potential. To assess this is of course a most difficult matter, depending as it does on the prevailing economic situation and on the interpretation of the factors involved in the concept "worth while."

One of the main purposes of this lengthy report is to evolve a uniform method of calculating these levels, and in the case of gross potential, estimates based on a uniform approach have been prepared, so that a confident comparison is possible between figures for different countries.

Amongst the important conclusions advanced in the report is that, although the gross potential is an upper limit fixed for all time, the technical potential has been rising for some years. Estimates of technical potential must therefore be revised from time to time in the light of such advances.

Generalising over a range of results, the report concludes that at present about 39% of gross potential is technically feasible over large Alpine regions, with a gradual decline in Yugoslavia, West and East Germany and Czechoslovakia—that is, in countries of lower mean elevation and run-off. In large areas comprising a wide range of natural conditions, existing national estimates are equivalent to an assumption that between 15 and 25% of gross potential can be exploited at the present time.

The Barberine Dam in Switzerland is typical of the way the countries of Europe have harnessed the resources of Nature to provide vital electric power

* *Austria, Belgium, Czechoslovakia, France, W. and E. Germany, Hungary, Italy, Luxembourg, Netherlands, Poland, Roumania, Switzerland, Yugoslavia.*

Looking into the future, the report suggests the possibility of a reversal of long-term trends. In comparatively recent years, the technical limit to hydro-electric exploitation has been rising fairly rapidly, while economic limits have remained roughly constant. It now seems likely that permissible costs per kW of hydro-capacity will slowly increase, while technical improvements will slow down. Thus more schemes which are technically possible will become financially feasible.

Taking an overall picture of this valuable report, it appears probable that in Italy, Austria and Switzerland present estimates of possible hydro-electric exploitation may be greatly exceeded. Smaller increments may be obtained in France and in the Western and Eastern zones of Germany.

In many countries not covered by the report, there is a widespread shortage of suitable hydrological records. In these cases the concept of gross hydro-electric potential may possibly be useful. The sparse basic data of scattered precipitation records may be used to estimate gross potential, and the relationship to this of technical and economic potential found in more highly developed countries may be used as a yardstick to assess the eventual output of river basins before full surveys are carried out.

TABLE I.—AGGREGATE HYDRO-ELECTRIC PRODUCTION POTENTIAL IN CONTINENTAL EUROPE

Hydro-electric Potential 1950	10^9 kWh per year	kWh per hectare	% of gross potential
Gross	1,278	5,960	100·0
Technically exploitable (estimate)	382	1,780	30·0
Economically exploitable* (estimate)	262	1,220	20·6
Economically exploitable (official)	244	1,140	19·1

* *Based on mathematical relationship of accepted economic limit to flow and head. The report concludes that the total could be* 294 × 10^9 *kWh.*

More Capital for Rural Electrification

INVESTMENT in rural electrification will be increased up to £7½ m a year by next year. Announcing this for the Government in a House of Commons debate last Friday, Mr. Geoffrey Lloyd said that this year the allotment is about £6 m, and £6½ m had been provisionally arranged for 1954, these amounts being substantially the total asked for by the area boards. However, meetings of chairmen of area boards had been convened and it had been decided that progress might be speeded.

Mr. Lloyd said that capital limitations have been masking the basic business and rural problems of rural electrification. Part of the cost of rural electrification is involved in the mains transmission lines of the area boards, and is born by the boards as a general expense spread over all consumers. The particular rural consumers concerned are, however, asked to pay a special contribution in respect of the spurs leading from main transmission lines. The various area boards have different methods of dealing with this contribution, and the Minister proposes to ask the B.E.A. and the boards to conduct a survey of these methods of contribution to see which seem best. It would be useful if boards were prepared to offer a variation in the method at present used to any consumer who wished for it.

It is common ground that the further rural electrification goes, the more difficult it becomes from an economic point of view. It is important to remember that the Act places a responsibility not only on the area boards but also on the B.E.A. It is the Government's view, Mr. Lloyd said, that this economic difficulty is a national problem, and that the B.E.A. as well as the boards have a responsibility for solving it: this view is, he said, shared by the B.E.A.

Because economic problems can be eased if consumption is increased, the Government has decided to remove the ban on promotional advertising which the last administration imposed. Responsibility for advertising in line with the national interest is placed on the industries concerned. Rural electrification especially, required promotional activity.

The debate to which Mr. Lloyd was replying had been initiated by Mr. Anthony Hurd, M.P. for Newbury, who proposed a motion urging "that steps should be taken to develop the supply of electricity in rural areas as much and as fast as possible." After a long debate which was notable for the praise most members had for their own area boards (with one exception) and for the particular method of rural consumer contribution practised, the resolution was agreed to.

Two More Scottish Projects

MR. MENZIES INAUGURATES GAUR SCHEME

TWO projects of the North of Scotland Hydro-Electric Board have been in the news during the past few days. The first, the Gaur power scheme in north-west Perthshire, was formally inaugurated on Saturday by the Rt. Hon. R. G. Menzies, Prime Minister of Australia. The second, the Loch Shin project, has now been confirmed by the Secretary of State for Scotland.

The Gaur scheme utilises the water flowing off the Moor of Rannoch into Loch Eigheach, which afterwards does duty three times more before reaching the sea—at the power stations of Tummel Bridge, Clunie and Pitlochry.

Work started at Gaur in the spring of 1950. The dam, some 350 ft long and 45 ft high, is built on solid granite at the outlet of Loch Eigheach. Construction of this dam has doubled the length of Loch Eigheach making it now about 1¾ miles long. The new reservoir has an effective storage of 17 million cu ft.

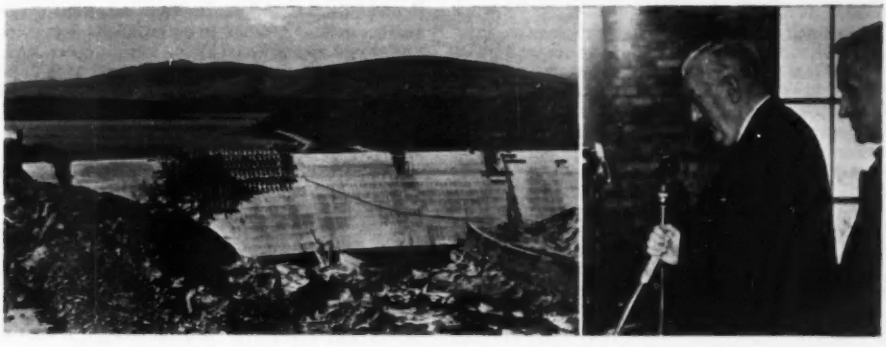
Standing on the banks of the River Gaur, the generating station houses one 6,000 kW vertical Francis turbine working under a gross head of 98 ft. It will generate 17 million units annually. A feature is the 1,400 ft long fish ladder, comprising 71 pools—the longest so far provided at any of the Board's schemes.

The hydro-electric plant was manufactured by Harland and Wolff for the English Electric Co.; the main control gates and valve being supplied by Glenfield and Kennedy. At the ceremony last Saturday, Mr. Menzies said the development of hydro schemes was a tremendous movement to restore and increase the balance of "this ancient land." It was a means of industrial expansion that was literally clean. Subsequently, Mr. James Stuart, Secretary of State for Scotland, announced that the Board had connected its 100,000th consumer to the supply from post-war generating stations—the total consumers now numbering 291,000.

The other scheme—the Loch Shin project—is one of the Board's major proposals, and provides for the construction of four dams and five generating stations with a total installed capacity of 40 MW. This scheme, estimated to cost £8,800,000, will produce about 151 million units annually. Its catchment area will cover more than 250 sq miles. Under the plan, Loch Shin will be raised and enlarged by a dam across the narrows just north of Lairg. Incorporated in the dam will be a generating station discharging into the remaining small part of Loch Shin. A second dam is to be built across the River Shin below the present outlet of the loch and water from this reservoir will be led by aqueduct to the main power station near Inveran Hotel.

Water from the upper River Brora will be diverted into the Shin catchment by a weir at Dalnessie and taken by aqueduct into the River Tirry. A generating station is also to be built near Creanich at the western end of Loch Shin and will use water diverted from the upper River Cassley and its tributaries. Feur Loch is to be enlarged by a dam, the water again being led by aqueduct to a power station on the southern shore of Loch Merkland near Garvault. The fifth power station will be on the north shore of Loch Merkland.

The Gaur scheme dam. Right, Mr. Menzies starts the machinery, watched by Mr. Thomas Johnston



overseas news

Yukon-B.C. Development Plan

Ambitious plans for the development of Yukon-British Columbia water power along with a major metallurgical enterprise, have been announced by Ventures Ltd. and Frobisher Ltd., who propose to combine their resources with those of two associated concerns for this project. Power survey permits have already been issued by the Federal and British Columbia Governments. The initial power development is expected to be quite small, but the ultimate plan provides for plant of at least 4,300,000 h.p., to be installed in stages as required. The initial 25,000 h.p. would be available by October 1955, it is expected, but the first two stages of the major programme, involving 270,000 h.p., would be completed in 1958 and 1960 respectively, using chiefly the waters of Atlin Lake. The third stage involving an additional 1,690,000 h.p. would be finished by 1962, and there would be provision for a main storage reservoir by a dam at the junction of the Yukon and Teslin Rivers.

Long-term Forecast

By 1975 the peak-load demand for electricity in Canada will have quadrupled, according to the estimate of Dr. A. G. Christie, Research Professor at the John Hopkins University, Baltimore. To provide the additional generating capacity Canada will have to spend $17.7 billion, he declared, speaking at a meeting of the Engineering Institute of Canada, earlier this month. By 1975 atomic power stations may be operating, but he advocated foresight and boldness in securing suitable power sites and establishing adequate plants. He also urged that immediate steps be taken to secure sites for future use before urban development or other commercial uses prevented the acquisition of the desired areas. In addition to hydro plants, it would be necessary to build large steam stations with high pressure-high temperature units, he added. He estimated that the 46,667 MW of additional generating capacity would cost $17,733 million to develop. To those who questioned this high cost, he pointed out that low-cost hydro sites near power-consuming areas had already been developed; the more distant sites would require costly transmission lines, while the cost of steam plant had also increased over 60% in the last 20 years.

Portuguese Scheme

Work is to begin soon at Picoto on the Douro River hydro-electric project under Portugal's six-year development plan. The site of the work is on the stretch of the river which forms the frontier between Portugal and Spain. A company is being formed to take charge of the work with a capital of 220 million escudos, half of which will be subscribed by the State, and the other half will be obtained by public subscription. Besides participating in the capital of the company, the Government will assure further financing required to complete the project, the total cost of which is estimated at 500 million escudos. The project is expected to be completed by 1958.

Turkey's Transmission Scheme

For the construction of overhead transmission lines and transformer installations in certain western provinces of Turkey, the Etibank has earmarked the sum of T£85½ million, we learn. The power lines will be about 700 km in length, with transforming stations at Izmit, Karabuk, Umraniye, Kutahya and Kirkkale. The network will connect up with the large hydro-electric stations now under construction in that area, such as the Sariyar scheme, which is to have an installed capacity of 160 MW. It is hoped that this power station will be in operation next year.

Scheme for Tanganyika

To facilitate the expansion and acceleration of hydro-electric development in Tanganyika, the Government has been asked by the Dar-es-Salaam and District Electric Supply Co. and the Tanganyika Electric Supply Co. to consider the issue of a new licence to cover the amalgamation of the two companies. This follows the Government's recent decision to seek the advice of a consultant on the present suitability of electricity facilities and their extension to commercial interests. The two supply companies have pointed out that there has been a phenomenal demand for electricity during the post-war period—the Dar-es-Salaam Co. alone sold over 24 million units to 11,500 consumers last year, which was more than double the 1948 figures. To meet this demand new plant, involving heavy capital costs, had to be installed. The solution would appear to be hydro-electric generation, the company states, such as has already been done to some extent by the two concerns, but Dar-es-Salaam is not well situated in this respect. Investigations are proceeding, however, in conjunction with the Department of Water Development, on the potential of the Ruvu River, and a detailed survey of the Rufiji River is shortly to be undertaken.

More Power for Copper Production

A loan of up to $22,400,000 to secure increased power supplies and enable expansion of copper and cobalt production to be undertaken, has been agreed upon with the Export-Import Bank of

Washington, by the directors of the Rhodesia Congo Border Power Corporation. The latter was formed in April last by Mufulira Copper Mines, Ltd., Nchanga Consolidated Copper Mines, Rhokana Corporation Ltd. and Roan Antelope Copper Mines, to co-ordinate power supplies for the Northern Rhodesia copper producers. Under this new loan, the Power Corporation will arrange for the four copper mining companies to extend their thermal power stations, so that by 1956, they will produce sufficient power to meet the estimated copperbelt load at that time. From 1957 onwards the load will rise steeply with the coming into full production of new mines. To meet this demand, the Power Corporation is arranging with the Comite Special du Katonga for the supply of 57 MW from installations on the Lualaba River in the Belgian Congo, for five years beginning in 1957, with the option to renew the agreement if necessary.

Opening of Owen Falls Dam

The Owen Falls dam, being built at Jinja by the Uganda Electricity Board, is to be officially inaugurated next April by H.M. Queen Elizabeth, who will be accompanied by the Duke of Edinburgh. They will fly from Aden to Entebbe airport on April 28, to begin their African tour, and the Queen will perform the ceremony at Jinja on the following day.

132 kV Bulk Supply over 225 miles

Provisional agreement has been reached on a scheme for a bulk supply from the Bokaro station of the Damoda Valley Corporation to the Calcutta Electric Supply Corporation Ltd., some 225 miles distant. Approximately half the length of the transmission line is already in existence, and the remainder would be constructed by the Damodar concern, we gather. Operating voltage would be 132 kV, we understand, with synchronous condensers installed at the receiving station, and the supply given to the Calcutta Electric Supply Corporation at Howrah at 33 kV. Initially, the demand would be about 45 MW in 1956, but this would probably increase to about 100 MW by 1959, it is estimated. Earlier the undertaking had proposed to construct its new Southern power station, and while awaiting an import licence for the necessary plant, it was approached by the D.V.C. with an offer to supply current from the Bokaro power station where a surplus of generating capacity exists. Following an investigation, including visits by Mr. Harold Hobson and Mr. J. H. Waters, directors of the Calcutta concern, to attend discussions with the D.V.C. and the consideration of the technical problems involved, a provisional agreement has been entered into for the bulk supply to commence in 1956.

Acquisition at Rangoon

The Government of Burma has given notice that it is proposed to take over the undertaking of the Rangoon Electric Tramway and Supply Co. as from October 1 next. The company has been operating its supply undertaking under a 50-year licence which would have expired in 1974—it no longer runs transport services—and recently the demand has been expanding at a rate which is beyond the resources of the company to finance, we learn. The five-year programme of capital extensions was to have been financed by the Electricity Supply Board of Burma, a government-sponsored body which was set up under the 1948 Electricity Act. The present generating capacity of the company consists of 61 MW of steam plant, augmented by two 435 kW diesel sets.

H.E. Scheme

A proposal to start a hydro-electric project at Barapole, 60 miles from Mercara Coorg state, is being investigated. The project would be able to supply power to Coorg and part of Madras and Mysore states.

India

The Punjab Government's proposal to install a power unit at the Bhakra dam project has been accepted by the Government of India. This decision was taken following a conference held recently in New Delhi under the chairmanship of the Minister of Planning, Irrigation and Power. It has also been decided that no more power generating units should be installed on the Nangal Canal except for the four 24,000 kW sets which are already scheduled to be installed. The design of the Bhakra Dam and its construction will now proceed on the basis that a power generating unit has to be accommodated at the dam.

Commission to be Reconstituted?

The reconstitution of the State Electricity Commission of Victoria is the aim of a new Bill which the State Government has under consideration, probably for introduction in the next session of Parliament, it is reported. The Bill will probably provide for three full-time Commissioners, instead of one full-time member and three part-time members. At present the State Electricity Commission consists of Mr. R. A. Hunt, chairman, who gets £4,000 a year, and Sir Andrew Fairley, Dr. W. D. Chapman and Mr. A. W. Henderson, part-time members, who each receive £500 a year.

Results from Melbourne

Operations of the City of Melbourne electricity supply undertaking for the year ended September 30 last resulted in a surplus of £55,998—almost double that of the previous year. Over 216 million units were sold at an average revenue of 2.071d. p.u. Domestic consumers took 21.4 million units. Mr. B. Woodfull, the city electrical engineer and manager, reports that the main engineering work during the year has been the extension at the Spencer Street power station, where it is expected that the 30 MW set and a further 15 MW unit will be in operation this year.

PERSONALITIES

IN THE INDUSTRY

Associated with Ferranti Ltd. since 1920, **Mr. E. T. Norris,** M.I.E.E., M.I.Mech.E., Fel.Amer. I.E.E., has been appointed consulting engineer to the company from July 1. His early experience in transformer designing was gained with Met. Vick., and he joined Ferranti's as chief assistant designer; becoming chief designer in 1922, and later, chief engineer in the transformer department. This work has included the design of all classes of power transformers up to the largest sizes and the highest transmission voltages; r.f. industrial heating plant, and h.v. laboratory equipments of a million volts upwards for a.c., d.c. and surges. Inventor of the moving coil voltage regulator and the astatic voltage relay which are now in widespread use all over the world, he has served on numerous technical committees, particularly as chairman of the E.R.A. Transformer Committee, the Transformer group of C.I.G.R.E., and of the International Study Committee No. 12. In addition, he was chairman of the I.E.E. Transmission Section in 1945-6, and member of the Council in 1945-8 and chairman of the North Western centre in 1946-7.

Mr. E. T. Norris

Mr. W. Lewis Smith has been elected to the board of Pirelli General Cable Works Ltd. He joined the General Electric Co. in 1924 as personal assistant to Mr. J. Y. Fletcher, director and manager of Osram Lamp Department and was transferred to Pirelli-General Wire and Cable Dept. in 1927, becoming manager of that department and of the Wiring Sundries Department in 1938. In 1949 he was appointed manager of the Conduit Department also, and is thus responsible for the general management of those three departments of the G.E.C. He has represented Pirelli-General on the C.M.A. for many years, and has been chairman of the O.R.C.M.A. and the R.C.M.A. and is at present vice-chairman of the C.M.A. One of the original members of the joint committee for the Electrical Cable Making Industry, Mr. Lewis Smith also represents C.M.A. on several inter-industry committees and is a member of the Executive Committee and Council of the Association of Steel Conduit Manufacturers.

Mr. W. Lewis Smith

Now in this country on an extensive study of electricity supply matters is **Mr. C. M. Gray,** M.I.E.E., M.N.Z.I.E., chief engineer of the Waitemata Electric Power Board, New Zealand. Among the subjects he is investigating is the practicability of adopting underground cable installations, control systems and heat pump apparatus. He expects to leave Britain in July or August, we understand.

The Minister of Transport has appointed **Mr. R. A. Lovell,** O.B.E., as deputy chief engineer, electrical and mechanical, in succession to the late Mr. A. E. N. Taylor. Mr. Lovell joined the Ministry in 1931 and has served on the headquarters staff throughout his career. Since 1946 he has held a senior post in the electrical and mechanical branch.

To succeed **Mr. F. H. Beasant,** B.Sc., A.M.I.E.E., M.I.Mech.E., who is taking up an appointment on the board of the Anti-Attrition Metal Co., Ltd., **Mr. G. J. Corson,** A.M.I.E.E., has been appointed manager, Traction Division, of Crompton Parkinson, Ltd., Chelmsford, as from July 1. Mr. Corson, who has been associated with electric traction for many years, was trained at the Engineering Faculty of the University of Bristol, and served an apprenticeship with British Thomson-Houston Co., with whom he subsequently served in several capacities, broken only by war service. Since 1948 he has been the traction representative located in the London office of B.T.H. in which capacity he has been responsible for dealing with all of the company's traction activities which are handled in London and the South of England. Mr. Beasant, who is joining the Anti-Attrition Metal Co., has been manager of Compton Parkinson's Traction Department since January, 1947, after earlier experience with Metropolitan-Vickers and as senior technical assistant for electric rolling stock with the London and North Eastern Railway.

Mr. G. J. Corson

Mr. F. H. Beasant

From Bastian & Allen Ltd. we learn that **Mr. J. C. Edwards,** sales manager, and **Mr. E. R. Weech,** chief engineer, have been appointed directors of that company. Mr. Edwards was educated at Manchester Grammar School, became a trainee with the Chloride Electrical Storage Co., Ltd., and gained further education at Manchester High School of Commerce and Manchester University. He joined Bastian & Allen in 1945 and was appointed sales manager in 1947. He was previously with W. T. Glover and Co., Ltd., in the capacity of supervising contracts engineer. Mr. Weech went to the United States at an early age, where he spent twelve years and received most of his training with the General Electric. Switchgear and automatic controls were his main interest, and he spent a year in the U.S.S.R. installing controls at the Dnieprostroy hydro-electric project. He has been with Bastian and Allen for the past eighteen years.

Mr. J. C. Edwards

Chairman and managing director of Fisher and Ludlow Ltd., **Mr. Arthur Keats** has been elected the first vice-president of the Engineering Industries Association.

Appointed as successor to **Mr. E. W. D. Elmer** whose retirement from the position of station superintendent at Ballylumford power station of the Electricity Board for Northern Ireland we noted on June 11, is **Mr. Norman Berry,** B.Sc. (tech.), previously the deputy station superintendent there. Mr. Berry went to Ballylumford as assistant to Mr. Elmer in 1943, having previously had experience with the Mersey Power Co. as a senior charge engineer at Percival Lane power stations "A" and "B," and with the Portsmouth and Oldham undertakings, following an apprenticeship with Lancashire Dynamo and Crypto, Ltd.

Mr. F. M. Dimmock, head of the Equipment Division of the B.B.C., is to retire on October 18 next after 28 years' service. He will be succeeded by **Mr. E. C. Drewe,** now assistant head of the Research Department. The latter position will then be taken over by **Mr. A. B. Howe,** at present a research consultant.

Mr. G. H. Webb, has been appointed managing director and chairman of Desoutter Brothers (Holdings) and its subsidiary Desoutter Brothers Ltd.

District engineer, Forest of Dean district in the Central Gloucestershire sub-area of the Midlands Electricity Board, **Major L. N. B. Donald,** A.M.I.E.E., is shortly to take up the appointment of senior assistant engineer (commercial) to the commercial officer for that sub-area.

The Minister of Fuel and Power has appointed **Sir George Thomson,** F.R.S., to be chairman of his Scientific Advisory Council in succession to **Sir Alfred Egerton,** F.R.S., who retires at the end of this month when his term of office expires. The Minister has also appointed **Mr. Kenneth Gordon,** C.B.E., M.C., to be a member of the Council. Sir George Thomson has been Master of Corpus Christi College, Cambridge, and Emeritus Professor of Physics at University of London since last year. He was previously for 22 years Professor of Physics at the Imperial College of Science. In 1946-47 he was scientific adviser to the British delegation to the Atomic Energy Commission of the United Nations. Mr. Gordon, who is director-general of Ordnance Factories, Ministry of Supply, was previously joint managing director of the Billingham division of Imperial Chemical Industries Ltd. for twelve years.

Sir George Thomson

Mr. L. H. Pulfer has been appointed to take charge of the B.T.H. Special Lamp Sales section at Crown House, to fill the vacancy caused by the death of Mr. R. A. Deans. Mr. Pulfer has been with the company for 31 years and for the greater part of that time has been connected with the sale of Mazda projector and special lamps.

Mr. Harold Wilcock and **Mr. B. H. Clark,** have been appointed to the board of the Burma Electric Supply Co. Ltd. Mr. Clark is also a director of the Calcutta Tramways Co.

President of the Electrical Contractors Association for the ensuing year, **Mr. S. L. M. Barlow,** Assoc.I.E.E., M.Amer.I.E.E., was inducted into that office at the annual conference at Bournemouth yesterday. Mr. Barlow, who has been managing director of Barlow and Young, Ltd., since 1933, and is also a director of Troughton and Young, is prominently known throughout the contracting industry, and is a member of the Council of the I.E.E. He joined E.C.A. in 1940 and became vice-chairman of the London branch in 1946 and chairman the following year. He has served on the London and Home Counties Sectional Board since 1945; was elected vice-chairman in 1949, and became chairman of the Board in 1951. Elected to the E.C.A. Council in 1947, he has served on the Executive Committee for the past two years.

Mr. S. L. M. Barlow

Editor of our contemporary, the *Electrical Industries*, for the past 25 years, **Mr. S. M. Hills,** A.M.I.E.E., has retired from that position. For many years he also edited *Electric Vehicles*. He gained early training at Northampton Engineering College and with the British Westinghouse Electric and Manufacturing Co. (now Met. Vickers), and joined the staff of Electrical Press Ltd. in 1924. Joint author of a paper with the late Mr. J. W. Beauchamp on "Industrial Electric Heating" read before the I.E.E. Informal Meetings Section, he was also active for some years in the affairs of the Junior Institution of Engineers.

Mr. S. M. Hills

Mr. C. Metcalfe, a director, has been appointed managing director of E.M.I. Engineering Development Ltd. He joined the Gramophone Co. as an engineer in 1930 and has since been associated with companies in the E.M.I. group. In 1935 he was appointed chief draughtsman of the design section of the Production Engineering Division, and since 1938 has collaborated in the design of the E.M.I. companies' domestic products.

Arising out of the retirement of Mr. P. Croom-Johnson (noted in our May 28 issue), chief engineer of London Transport, changes in organisation and new appointments are announced. **Mr. C. E. Dunton,** M.A., M.Inst.C.E., at present civil engineer, becomes chief civil engineer; **Mr. A. C. Edrich,** A.M.Inst.C.E. now permanent way engineer (railways) becomes assistant civil engineer (permanent way), and **Mr. T. S. Pick,** B.Sc. (Eng.), M.I.E.E., M.Inst.F., at present electrical engineer, is appointed chief electrical engineer. Mr. Pick started with the London Electric Railway Co. in 1923, and has had extensive experience with London's Transport.

Mr. T. S. Pick

Among those in industry to whom H.M. The Queen has awarded the Coronation Medal for loyal service to the Crown is **Dr. S. English,** joint managing director of Holophane Ltd., and a past President of the Illumination Engineering Society. Dr. English is also vice-chairman and treasurer of the National Illumination Committee of Gt. Britain, and member of the Executive and Finance Committees of the International Commission on Illumination.

OBITUARY

Mr. Bertram Thomas, chairman of Bertram Thomas (Engineers), Ltd., died on June 17. Educated at the City of London School, Blackfriars, and at the City Guilds Finsbury Technical College, he started with Woodhouse and Rawson, Ltd., and went to Manchester towards the end of last century to engage in contracting work. A notable contract at that time was for wiring the John Rylands Library in Manchester, where conduits were of copper and casings were specially drawn in bronze. About the beginning of this century he started to manufacture d.c. switchgear, which was successfully developed, and still later he started a third business—the manufacture of engineers' storage tiltrack gear. He was an original member of the Engineers Club (of which he was at one time president), of the Batti-Wallahs', and a member of the Clarenden Club of Manchester. A keen fisherman, he was a very likeable character, full of humour, despite being partially crippled by a worn hip joint.

Mr. Bertram Thomas

Mr. A. G. Perry, a director of Heatrae Ltd., died on June 12.

Mr. Thomas Carter, M.Inst.C.E., M.I.E.E., Fel. Amer.I.E.E., who died on June 16, aged 76, was a well-known North-Eastern electrical engineer. Educated at George Watson's College and at Heriot-Watt College, Edinburgh, he began his career as an indentured apprentice with J. H. Holmes and Co., with whom he ultimately served successively as chief electrician, chief designer and chief engineer before leaving the company to join A. Reyrolle and Co., Ltd., on whose staff he served for 25 years. At various times he was a member of the council, chairman and honorary treasurer of the North-Eastern Centre of the I.E.E., and he had also been chairman of numerous committees of the E.R.A., B.E.A.M.A., and B.S.I.

Mr. Thomas Carter

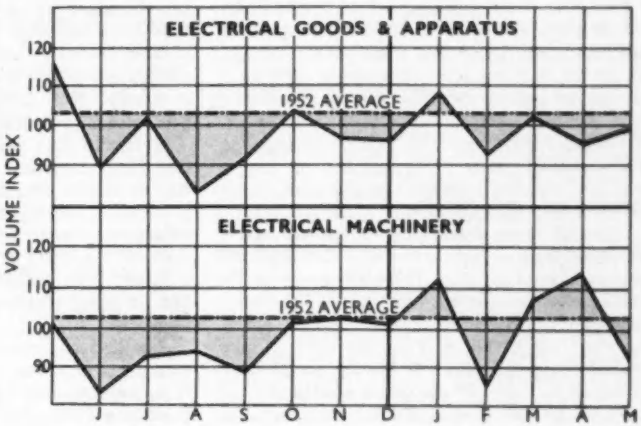
Mr. E. P. McAllister, M.I.E.E., who died in London on June 13, aged 45, returned from India about two years ago where he had been engaged in the erection of an electric lamp manufacturing factory. Prior to going to India in 1949, he was manager of the Solus Teoranta electric lamp factory in Dublin.

EXPORTS AND IMPORTS

EXPORTS VOLUME INDEX

Unlike the electrical machinery side which recorded a slight reduction in exports for last month, the value of the lighter class of electrical goods and apparatus sent abroad during May was slightly higher than during April. The extent is indicated by the "Electrical Times" volume index, whose value is 99, compared with 96 previously, both based on 1950 as 100. The actual value of this class of exports was £8,892,090.

But in the heavier machinery class, the reduction in exports amounted to £1,364,171 compared with the previous month. Here the volume index is 12 points down on that for April, with 1950 equalling the 100 basis.



COMPARED with April, the total value of all electrical goods exported during May decreased by nearly £1 million. To some extent this may have been due to Whitsun holidays interfering with works output. Even the convertors, transformers and rectifiers group, whose export output has been a heartening feature for many months, recorded a reduction from the previous month's figures. In addition to the goods listed in our table, complete electric washing machines, not exceeding 150 lb in weight, to a total value of £344,762 were sent abroad in May (almost double the April figure) together with larger models aggregating £78,194 in value. The month also saw portable electric tools worth £132,150 exported from Britain.

Description	Exports Value Month of May			Imports Value Month of May		
	1951 £	1952 £	1953 £	1951 £	1952 £	1953 £
Telegraph and Telephone Wires and Cables—						
Submarine	12,711	56,467	1,738	—	—	—
Other	556,098	963,895	767,058	—	—	—
Rubber Insulated	538,880	801,757	462,986	—	—	—
Insulated, other than Rubber	1,019,841	1,368,244	1,392,324	—	—	—
Wireless Apparatus, including Valves	1,124,999	2,092,797	2,081,933	272,797	329,834	335,474
Telephone and Telegraph Apparatus	1,137,776	1,528,260	1,415,079	—	—	—
Electric Lighting Appliances, Accessories, Fittings and Parts:—						
Filament Lamp Bulbs	146,204	126,642	100,827	17,850	5,944	5,804
Other Descriptions	361,082	459,565	451,258	51,017	36,746	26,191
Batteries (primary)	249,823	286,480	227,200	—	—	—
Accumulators, Portable	366,475	354,226	224,619	—	—	—
Stationary	51,292	81,053	54,799	—	—	—
Parts and Accessories	56,614	74,032	52,360	—	—	—
Electrical Cooking and Heating Appliances	458,279	511,937	260,170	—	—	—
Ammeters, Voltmeters, etc., and Parts	134,036	132,289	135,297			
House Service Meters	106,573	169,404	126,601	47,051	53,821	77,567
All Other Instruments	186,458	132,832	162,421			
Electro-Medical Apparatus	60,077	40,842	34,140	—	—	—
X-Ray Apparatus, etc.	116,144	129,879	115,334	31,879	40,276	19,033
Insulating Materials	224,184	190,255	106,987	—	—	—
All Other Articles	576,400	716,176	708,959	107,643	181,310	82,692
TOTAL OF GROUP	8,483,946	10,217,027	8,892,090	528,227	647,931	546,761
Electrical Machinery:—						
Generating Sets, Diesel (not exceeding 200 kW)	415,694	465,246	294,515			
" " " (exceeding 200 kW)	342,278	209,421	75,426	73,942	53,978	34,845
Other Generating Sets	86,771	106,501	161,904			
Generators minus Prime Movers and Parts	341,525	483,634	899,495			
Motors	873,793	915,421	814,151	35,020	48,546	35,509
Convertors, Transformers, Rectifiers, Motor Control Gear, Switchgear, other machinery	2,429,160	2,921,078	2,398,048	27,982	27,250	75,345
Fans, Electrically and Power Driven	177,680	198,074	270,111	—	—	—
Vacuum Cleaners or Electrically Operated Appliances	517,390	457,156	360,716	—	—	—
TOTAL APPLIANCES AND MACHINERY	13,668,237	15,973,558	14,166,456	665,171	777,205	692,460

Fixing In Concrete Made Easy

TO obviate the arduous task of boring holes in brick and concrete often encountered in electrical installation and other work, Messrs. F. H. Bourner and Co. (Engineers), Ltd., have developed a power tool for driving pins direct into such materials. Known as the "Supa Dynamic," their tool uses blank cartridges as the source of power. Although this method is not new, the tool possesses two features claimed by the company as unique.

One of these features is a special barrel designed with a stop to control the depth of penetration of the pin. The other involves the use of a barbed pin for driving pins into steel. The pin is driven by a piston which has a bevelled edge, this striking the steel surface surrounding the pin and forcing metal over the barb to "crimp" the pin in position.

Basically the tool is similar to a firearm, although it is not considered as such within the meaning of the Firearms Act and therefore not subject to licence. It consists of a removable barrel, locked into a breech holding a 0·22 in. edge-firing cartridge. Surrounding the barrel is a flash barrel, whilst the breech and firing mechanism is held in a cap which also serves as a handle. The lower end of the barrel is protected by two flash guards, one removable.

Normally pins are driven into surfaces by the direct method, using the size of barrel appropriate to the pin. Where the firing surface is of soft material, as in the case of a wood batten required to be fixed, by pins, to a wall, the piston method is used with the stop. Here a larger bore barrel (1·4 mm.) is necessary, but in other respects operation and use are identical.

Supplied as a complete kit with the tool are four sizes of barrel, a range of pin sizes and types and cleaning equipment. Pins may be of the flat end type, or more usually stud-ended, the standard thread being Whitworth. Special pins are also available, including one designed for securing spacer saddles.

Introducing
THE REVO MONARCH

DESIGNED to appeal to both eye and purse of the modern housewife, Revo Electric Co.'s newcomer to the cooker market, the "Monarch," reflects a marked change in the approach to cooker design. Although retaining the post-war development of the plinth base, the new model features a re-siting of the controls away from the conventional position at the side of the oven chamber. Their new position is along the top of the splash plate.

To the housewife, the change in controls positioning has an added advantage—an increase in the cooker capacity. With an oven size of 15¾ in. wide by 14 in. high by 13¼ in. deep, the capacity is now 2,960 cub. in. for the same loading of 2·1 kW. Moreover, the added width allows placing utensils side by side in the oven. It has also been possible to increase oven lagging from 1 in. to 3 in., which has effected a substantial reduction in the exterior temperature of the cooker.

Two models are being produced, differing only in the hob equipment. In the basic model, two solid type 8 in. diameter boiling plates are provided together with a 10½ in. by 8 in. grill boiler, sufficient for most modern families.

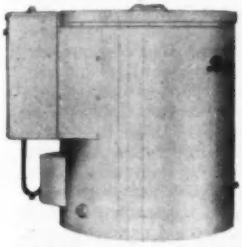
Here can be seen the attractive appearance and accessibility of controls of the "Monarch"

Each is controlled by a three-heat switch. The other model is fitted with a radiant type boiling plate and a 'Simmerstat' control.

The BUYER'S *Column*

Water Heater for Farms

DESIGNED to produce large quantities of hot water at an economic rate, the Agricultural Water Heater produced by BURCO LTD., Rose Grove, Burnley, Lancs, is a new departure by the company, who are known principally for their domestic wash boilers and washing machines.



The new heater has a capacity of 24 gallons and is heated by a 1½ kW thermostatically controlled element. It is claimed that the element takes four hours to raise water from 50°F. to 140° F. Due to the special design of the heater and the position of the tap outlet, the first 19 gallons of hot water can be drawn off rapidly under gravity with no temperature drop. The remainder flows out slower, being dependent on the water flow feeding the auxiliary tank.

Glass fibre insulation is packed between the water container and the outer casing of the heater, which is supplied in galvanised finish or white enamel with chromium plated fittings.

Overall dimensions are: height 28 in., width overall 30½ in. and total weight when full of water, 350 lbs. Tank width is 22½ in. The price is £27 for the galvanised steel case or £30 for the white enamelled casing with chromium plated fittings.

Price Reductions

THE prices of the electric thermal storage radiators marketed by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, have been reduced by 21% from £16 to £12 10s. as announced recently by the company.

Another substantial series of reductions are announced by FOSTER TRANSFORMERS LTD. (an L.D.C. company) of South Wimbledon, S.W.19. These are as follows :—

Small open and semi-enclosed transformers reduced by	5%
Portable tool transformers reduced by ...	10%
Standard "R" type neon transformers reduced by	10%
Ignition transformers reduced by	15%
Ring type current transformers reduced by ...	10%
H.V. testing transformers reduced by ...	10%
Foster Static Phase shifting transformers reduced by	10%
Constant Voltage transformers reduced by ...	5%

These reductions are now effective.

We also understand that the "Astral" refrigerator by ASTRAL EQUIPMENTS LTD., 96 Buchanan St., Glasgow C.1, has been reduced to 38 guineas inc. p.tax.

Flameproof Telephone Equipment

A FLAMEPROOF automatic telephone has been developed by HEYES & CO., LTD., Waterheyes Electrical Works, Wigan, for use in situations where petroleum vapour is present.

The telephone is designed for use on standard automatic exchanges, and can be supplied with either a cast iron or a cast aluminium enclosure and with two receivers, as desired, for use in noisy situations in works and installations.

The terminal box may be fitted with cable sealing glands for armoured cable or tapped for conduit as preferred.

A range of flameproof extension bells and relays for the operation of signal lamps or mains voltage flameproof bells is also available.

Flameproof junction boxes, for both armoured cable and conduit, and flameproof barrier boxes are offered for use within the hazardous area, whilst a range of non-flameproof link disconnecting boxes facilitates the connection and testing of multi-core cables outside the area.

All the flameproof equipment carries the Ministry of Fuel and Power certificate for gases and vapours under Groups IIa and IIb.

New Range of Prenlock Control Units

THE new range of consumers' control units introduced by PRENTICE, LTD., Gelderd Road, Leeds 12, under the name "Prenlock" incorporates an effective design of interlock a.c. switch, which under normal circumstances makes it impossible for the unit to be opened at all with the switch made or for the switch to be operated with the unit cover open.

The neat exterior of a wood-cased control unit

These new units are available either in metal-clad finished in cream stove enamel finish or wood cased in highly polished hardwood, both fitted with 60 amp double pole a.c. interlocking switch for 250 V s.p.n. They may either have rewirable fuse bridges or take h.r.c. cartridge fuses to BS.1361. In the latter models there is provision for storing spare cartridges.

The interiors are easily removed to facilitate wiring, provision being made for the fitting of earthing bars as desired.

The units are suitable for either vertical or horizontal mounting. Detachable way labels are provided.

D

V. & E. Westminster "Chimes"

AS a gift or presentation in Coronation year the "Westminster" eight-note electric door chime is specially appropriate for this new model introduced by V. AND E. FRIEDLANDER LTD., Macclesfield, Cheshire, gives a faithful reproduction of the full eight notes of the Westminster chimes.

Driven by a 20 V geared synchronised motor, the chime is housed in a polished wood case with burnished tubes. It is designed for use with the company's "Consort" transformer on a.c. mains 110-130 V or 200/250 V.

Other circuits are available for the chimes, giving a single note for a back door and a further single note for a third door or internal call signal. Packed in a colourful carton complete with wiring diagram and screws for fixing, the unit retails at £8 8s.

More Efficient Tubes

A FURTHER improvement in the efficiency of the Atlas White (3500° K) fluorescent lamp is claimed by THORN ELECTRICAL INDUSTRIES LTD., 105 Judd St., W.C.1, who say that average efficiency throughout the 5,000 hours life of the 5 ft. 80 W white tube is now 4,000 lumens, an increase of 8.7%.

"Ensynamel" Wires

DEVELOPED in the laboratories of ENFIELD CABLES LTD., Brimsdown, Middx., a new synthetic enamelled wire named "Ensynamel" is said to be cheaper than that insulated with the conventional vinyl acetal enamels. The company say that they consider that Ensynamel in all its properties represents a great advance on oleo-resinous enamels made to the requirements of B.S.156. The wire is supplied in gauges 15-45 s.w.g.

"Ensynamel" is based on a new synthetic resin. It is lighter in colour than vinyl acetal enamel and combines flexibility with high abrasion resistance. It has good reactance to varnish solvents and has good electrical characteristics. Further details are to be found in the company's publication EN.114.

TRADE PUBLICATIONS

REFRIGERATOR ACCESSORIES.—Latest catalogue of Zero Electric Ltd., 27a Bath Road, Walsall, will be of interest to contractors and dealers who carry out refrigerator servicing.

GEARED MOTORS.—Leaflet No. 531 gives details of the whole range of NECO geared motors. These are illustrated in their correct relative proportions to assist buyers in visualising their sizes—Normand Electrical Co., Ltd., North St., Clapham Common, S.W.4.

TRANSFORMERS.—A cordial invitation to visit the firms works together with a diagram of approach routes is featured in leaflet FM13 issued by Foster Transformers Ltd., South Wimbledon, S.W.19.

DOMESTIC APPLIANCES.—Leaflets 147, 217, 822 and 903 issued recently by Bulpitt and Sons, Ltd., Swansea Works, Birmingham 1, feature respectively the redesigned "Waldorf" fire, ground base holloware, kettles and percolators, including the new Dorchester model and finally the firms range of immersion type elements.

SWITCHGEAR.—"Switchgear News" No. 16, published by Cooke and Ferguson Ltd., Manchester 11, is devoted to control room equipment.

ALUMINIUM.—"The Aluminium Courier" journal of the Aluminium Development Association, is concerned in its 21st issue with rail transport.

SWITCHES.—The latest "Surflush," "Realflush" and "Nearflush" switches introduced by Falk Stadelmann and Co., Ltd., are featured in leaflet P2428, published by the company.

FURNACE LINING.—"Pinnaco" plastic firebrick and "Stixene" high temperature resistant fire cement are described in leaflets recently issued by the Furnace Lining Co., Ltd., Nursery St., Sheffield 3.

TELEPHONES.—Under the title "Serving Industry," Communication System Ltd., Showger House, 8 Arundel St., London, W.C.2, have published a brochure which lists "just a few typical users" throughout the world.

PRESSURE COOKERS.—"Silver Lining" magazine of the Hawkins Universal Pressure Cookers Users Club contains in its special Coronation Commemorative issue No.17 an attractive insert of portraits of the Royal Family. This publication is issued quarterly by L. G. Hawkins and Co., Ltd., 30-35 Drury Lane, W.C.2, to registered users of Hawkins Pressure Cookers.

NICKEL.—A summary of the properties of spheroidal-graphite cast iron is included in a recent issue of the Nickel Bulletin, published by The Mond Nickel Co., Ltd., Sunderland House, Curzon St., W.1.

REFRIGERATORS.—Components for refrigerators are listed and illustrated in the 1953 catalogue of Refrigerator Components Ltd., 1-2 Greycoat Place, London, S.W.1.

SWITCH AND FUSEGEAR.—Consumers' service units, complying with relevant E.D.A. and British Standard specifications, are featured in Publication No.325, published by British Insulated Callender's Cables Ltd., 21 Bloomsbury St., London, W.C.1.

The Watch of the Future?

THE "Electronic" watch, described briefly at the Horological Institute last week, bids fair, it would seem, to oust the present spring-wound type from its present monopoly. Its chief advantage lies in its ability to run continuously for two years, using a constant output power source.

The need for secrecy precluded the possibility that Mr. F. Lip, of the French watch company who are to manufacture the watch, would describe it in detail. He told the meeting, however, that his watch was driven by a motor weighing 0·6 gm. This motor was of the oscillating rotor type, the rotor being a balance wheel located between two parallel solenoidal windings.

Power for the motor is obtained from, in his version, two tiny batteries, total weight 1·33 gm. (in an American version developed in collaboration with the Elgin Watch Co., one battery only is used). It is in the battery, and what lies between it and the motor, that the secret, and success, of the watch is found. In the battery itself, a considerable number of years' research took place before a unit of this size, maintaining a constant potential and not emitting gas likely to cause corrosion, could be produced. The outcome of this work was a cell of 1·3 V potential, guaranteed not to vary by more than 1% for two years.

Battery capacity is 1,000 coulombs, and the power demand by the motor is 6 μW no-load, rising to 10-11 μW loaded. This power is not, however, supplied continuously, as the rotor operates a switching mechanism after having been displaced by a given amount. The rotor acts against a hair spring, which returns it when the current is switched off. As the rotor swings back past the central position another pair of contacts is closed, energising the other winding, and the process is then repeated.

Germanium Triode in Production

GERMANIUM triodes can be used for many of the purposes for which thermionic valves are more common, and examples of this important post-war development attracted attention at many technical exhibitions. Now the General Electric Co. has announced that germanium triodes of the point contact type are in pilot plant production at the company's works. They are being made available to equipment makers in sufficient quantities for experimental work and for the building of prototype equipment.

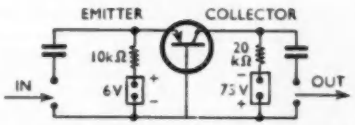


Fig. 1. Circuit of an amplifier using the G.E.C. triode with which a power gain of 17 dB may be obtained

The triodes consist of a single crystal of germanium hermetically sealed in a metal can, with all electrodes insulated. A typical circuit with a triode in use is shown in Fig. 1, while Fig. 2 presents characteristic curves of the new device. These show the current gain to be greater than 2, the knee voltage to be less than 3, and that the collector current at —30 V for zero emitter bias is less than 2 mA.

Maximum d.c. collector voltage is —50 V, but the triode normally operates with a much lower voltage, supplies of 22·5 V being typical. Triode dissipation has to be kept below 100 mW.

Triodes of this type are suitable for use in amplifiers and oscillators, and for electronic switching applications. They are considered especially suitable for digital computor work.

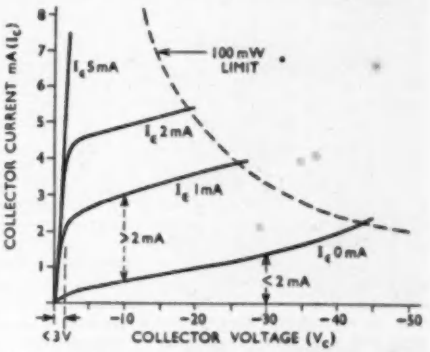


Fig. 2. Showing the static characteristics of the germanium triode

The WEEK in NEWS

Dumfries Rejects All-Electric Houses

Council Decides on Gas for Cooking and Electricity for Light

WITH the necessity to economise as much as possible in the building of new council houses, the problem of whether to install electricity only or gas and electricity on council estates is being discussed and argued in numerous boroughs throughout the U.K. Latest debate on the subject was at Dumfries where the town council has been recommended to rescind a decision made in January to build all-electric houses. It has now been decided to provide gas for cooking and electricity for lighting in the 200 houses in the Summerhill housing scheme. In January it had been stated that the difference in cost between the two services was £12 but information from the Gas and Electricity Boards recently obtained showed a difference of £4 1s. 10d.

At the meeting of the Housing and Works Committee, Ex-Provost Bell said he thought it only reasonable that gas should be provided for cooking and electricity for lighting, and if that was done there would be equity for all. He formally moved that both services be provided. Another aspect in the argument was mentioned by Bailie Marchbank who said figures had been received disclosing that maintenance of electric cookers cost more than gas appliances. By installing the latter, he said the saving would amount to about £900 on the scheme. The same speaker also mentioned an alleged survey carried out by the National Council of Women's Organisations who were said to have found that 82% of women preferred gas for cooking. Bailie Marchbank also mentioned a "booklet issued by the electrical industry" in which it was stated that there should be complete freedom of choice in the householder's use of gas or electricity.

Other comments on "Gas v. Electricity" will be found on page 1210.

Simplified Census Again for 1953

AS announced towards the end of last year, sampling methods which were introduced for the Census of Production for 1952 will again be used next year. An order indicating the scope of the census to be taken next year for 1953 was made by the Board of Trade last week. The decision to take a simplified sample census—for the second successive year—was made after discussions with the Census of Production 1953 Advisory Committee, and will, of course, mean less work and trouble for all concerned. As before, the Census will cover all producing industries, and returns will be required from firms above a certain size. A sample will be taken of the smaller concerns.

BOARDS CAN STEP-UP ADVERTISING

ANNOUNCED in the course of last Friday's Commons debate on rural electrification and reported elsewhere in this issue, was the Government's decision to lift the ban on promotional advertising by the nationalised Boards. Among the first to take advantage of the relaxation will be the E.D.A., who only a short time ago launched a new campaign to draw the public's attention particularly to the advantage of cooking and water heating by electricity, (see June 11 issue). The Boards too will be anxious to increase revenue by utilising this new freedom, and as has been indicated in these columns previously, some at least have laid careful plans to cope with this announcement. The need for more revenue and the keen competition which now exists between the fuel industries is bound to result in an almost immediate resumption of promotional activities.

Aluminium Freed

PRIVATE trading in aluminium is to be resumed next Wednesday, the Minister of Materials announced on Monday. From that date the price of aluminium is also to be reduced by £6 a ton to £155 a ton.

The First Half-Century

It would be an interesting question for discussion whether toleration of platitude is a condition or a consequence of conspicuous success in life. In either case the relation between the two seems to be one of those mysterious dispensations of Providence designed to make the rest of us content with our more humble status. There may be those who question that any such relation exists, but they could hardly have listened to the Presidential Adress to the I.E.E. without having their doubts shaken.—*From our issue of June* 25, 1903.

Steel Production in U.K. Last Year

IN its report for the year ended September 30, 1952, the Iron and Steel Corporation shows that the total production of steel during the year reached 18·51 million tons ingot equivalent, the highest figure since the war. Imports of steel during the year were substantially increased over previous years, 1·82 million tons being imported, compared with 0·56; 0·58 and 1·14 million tons for the three preceding years. Moreover, production in this country showed a marked increase. This is due in part to new or rebuilt and enlarged blast furnaces coming into operation, a factor which the report states will help to lift the steel output in 1953 to 17½ million tons.

Although it was intended that the bulk of steel imports should come from the United States, only 36% came from that country, due to a combination of the American Steel Strike last year and a favourable turn in market conditions in Europe, which then became the principal source, together with other steel supplies from Japan.

Electricians and the London County Council

SHOULD the London County Council employ only electricians who are members of the E.T.U.? The problem arose last week-end regarding two electricians employed at the Stockwell depot of the L.C.C., who had ceased to be members of the Electrical Trades Union some time ago. The Union maintained that the men must rejoin, or otherwise the L.C.C. might be faced with the prospect of a strike against the employment of non-unionists. The council also told the two men that they must compose their differences with the union. But it was over the terms of readmission that the real difficulty arose, there were opposing views on the payment of fines and subscriptions.

The L.C.C.'s position was explained by Mr. I. J. Hayward, leader of the Council, on Tuesday, when he emphasised that there was no question of a "closed shop" policy. It seems that the two men did not propose to seek readmission to the union, and accordingly they were given notice by the L.C.C.

Display Trophies to Northern Showrooms

FOLLOWING our report last week of awards in the Hoover display competition, we note this week that principal honours in Prestcold's annual contest have again gone to the north. Moreover, third prizewinners in last week's results, the Whitechapel, Liverpool, centre of the Merseyside Board gained second prize in the similar section devoted to Electricity Boards. First prize in that section went to the N.W. Board's Swinton, Manchester, showroom, and third prize to the E. Midlands Board at Northampton. Apart from these awards five other service centres won merit prizes. First prizes in class B devoted to departmental stores, and class C assigned to Prestcold dealers, went to Grant Bros Ltd. of Croydon, and G. R. Marson Ltd., of Coventry, respectively.

Engineering Society Celebrates Jubilee

A CONVERSAZIONE and Exhibition is being arranged by the Rugby Engineering Society to mark its fiftieth anniversary which occurs in October. These events will in fact take place during the preceeding month, on September 24, 25 and 26, at the Rugby College of Technology and Arts, which has been kindly put at the Society's disposal for the three days. The exhibition will have as its major theme, the progress of engineering in Rugby during the half-century of the Society's existence. It is hoped that with the co-operation of local engineering firms, the exhibition will be one of outstanding interest.

Amalgamation of Districts in Scotland

IT has been announced by the South West Scotland Electricity Board that the Clydebank and Scotstoun districts in the Clyde sub-area have been amalgamated. The office of the combined district, which will be known as the "Clydebank and Scotstoun district," is at 2385 Dumbarton Road, Glasgow, S.4. District engineer is Mr. J. McIntosh, and district commercial engineer Mr. A. M. Korn.

Our example of a good street lighting installation comes from Eltham High St., where over 30 of the British Thomson-Houston Co.'s new type 5 ft fluorescent lanterns, exhibited first at this year's B.I.F., were used. Features include corrosion-resistant aluminium canopy and a single one-piece "Perspex" cover bowl free from drilling and riveting. It houses three 80 W lamps

European Coal Supplies Steadier in 1952

PROMINENT feature of the European coal market during 1952, was the return to some stability between the demand for solid fuel and available supplies. This is the judgment of the Coal Committee of O.E.E.C., expressed in a newly published report. If efforts made by producing countries in 1951 and 1952 are continued, production can be expected to increase by another 12·1 m. tons in 1953. Consumption will also continue to expand, but its rate of increase should be slower. The position with regard to coking coal may, however, remain difficult.

Amongst the recommendations of the Committee, which have been endorsed by the Council of O.E.E.C., is one calling on users to limit the tonnage of bituminous coal other than coking plant to their essential requirements.

Research Work in Building

DURING the financial year 1951-52 some £700,000 of public money was spent on building research and associated publicity. This figure is estimated in the second report of the Ministry of Works Advisory Council on Building Research and Development. The council, which has the duty of keeping under review the whole field of building research and technical development, suggests that at present attention should be focused on studies which may shortly bring about savings in money or scarce materials.

Specific importance is attached to investigations likely to improve efficiency in the use of fuel, and any steps taken to accelerate the publication of results of such work are to be encouraged. It is noted in particular that an early pronouncement on panel heating systems is urgently needed.

In the field of utilisation, emphasis is given to the value of investigations into the economics of using mechanical methods and plant. It is concluded that there is no need for further work on the economics of using portable powered tools.

OFFICIAL PUBLICATIONS

BRITISH STANDARD B.S.378: Solid drawn copper and copper alloy tubes for condensers, evaporators, heaters and coolers.

AMMUNITION. Productivity Team Report. Available from British Productivity Council, 21 Tothill St., S.W.1. Price 5s.

IRON AND STEEL CORPORATION. Annual Report and Accounts 1951-52. (See page 1209.) H.M.S.O. 3s. 6d.

COMMERCIAL CONDITIONS IN BURMA: a B.o.T. Review. H.M.S.O. 1s.

HYDRO-ELECTRIC POTENTIAL IN EUROPE: Published by U.N. and available from London Information Centre, Russell Sq., W.C.1. (see page 1195).

Familiar sight in the harbour at Torquay during the B.E.P.C. earlier this month was the yacht of Mr. Ray Berry, the Warrior Geraint. Picture shows the motor vessel specially illuminated and providing an attractive sight against the background of the town

FREEDOM WANTED IN CHOICE OF FUEL

East Midlands

LOCAL authorities in the E. Midlands are to be asked by that Area's Consultative Council to provide better wiring facilities so that tenants can have a wider choice of electrical appliances. Particular emphasis has been laid on the need to provide a cooker circuit in kitchens. Tenants ought to be allowed freedom in the choice of the type of apparatus to be installed, the Council urged.

Sheffield

A RECENT proposal before the city Council gives the first tenant to occupy houses the choice between gas or electric cookers. It was decided that where no other cooking facilities were available, all houses built would be fitted with gas or electric cookers. At the same meeting a Y.E.B. suggestion to carry supplies by o.h. lines to new estates was rejected. The Board maintains that the supply required did not justify laying the cables underground.

Lampeter (Wales)

THE local council agreed recently that their tenants should be given a free choice as to whether they required gas or electric boilers. They are already able to state their preference in the matter of cookers.

Sussex

S.E. Gas Consultative Council is trying to obtain detailed information as to the circumstances which led to a decision by Battle R.D.C. to exclude gas from a local housing estate. The Council's views have been sent to the Minister of Fuel and Power urging that efforts continue in the interests of gas consumers for putting into practice the principle of freedom of choice. Where gas was available, the normal practice was to install both gas and electricity in council houses so that tenants could make their own decisions, the Council stated.

Wye (Kent)

IT has been decided that 37 new council houses in the district will be all-electric.

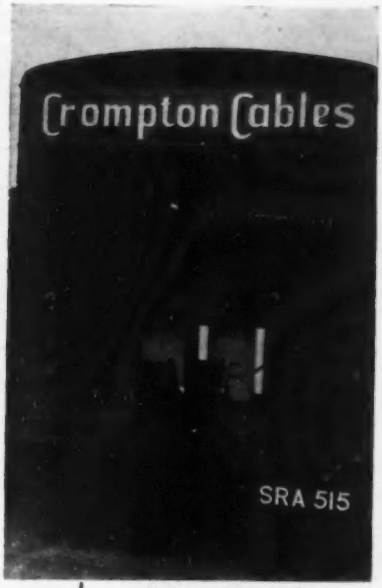
H.V. Cable Testing in the Field

FIELD testing, with high-voltage direct-current of cables up to 33 kV can be carried out by a new mobile test unit developed by Crompton Parkinson Ltd. This unit includes a two-valve rectifier equipment, alternator, electrostatic voltmeter and control gear, all installed in a 15-20 cwt. Morris-Commercial van. Auxiliary test gear provide for fault localising and other tests.

Maximum d.c. output is 120 kV between poles or 60 kV to earth. The alternator, driven by a power take off from the van's gearbox is rated at 1.65 kVA 230 V single-phase 50 c/s, and is used when normal 230 V a.c. mains are not available. An induction regulator, remotely operated from the control panel, is used to provide a varying input to the step-up transformer and thus can be used to give the desired d.c. output. Glass screens protect the operators from the h.v. equipment when in use, and also give a clear view of the electrostatic voltmeter and the heater circuit milliameters.

Control panel instruments include the alternator voltage regulator, output voltmeter, ammeter and frequency meter, valve filament controls and protective gear.

The equipment was designed by the Crompton Parkinson cable test department staff at Derby, and the installation carried out by work's employees into a special body built by Messrs. Kennings Ltd., also of Derby.



View of the interior of Crompton Parkinson's new mobile cable testing unit

Foundation Stone Laid at Telcon Works

ON Monday of this week the laying of the foundation stone at Crawley New Town marked a further step in moving the Works of the Metals Division of the Telegraph Construction and Maintenance Co. from Greenwich. The ceremony was performed by Lord Colgrain, chairman of the company.

Proposing the toast "The Crawley Factory," at the lunch which followed, Mr. J. N. Dean, managing director of Telcon, commented on the rise of the metals division since its birth in the 1920's.

In replying, Mr. W. F. Randall outlined briefly plans for the new factory. Work at Crawley will be devoted to the manufacture of magnetic materials, electrical resistance alloys and other special metals.

Sir Thomas Bennett, C.B.E., chairman of the Crawley Development Corporation, proposed "Telcon at Crawley," to which Lord Colgrain replied.

Heat Control Committee

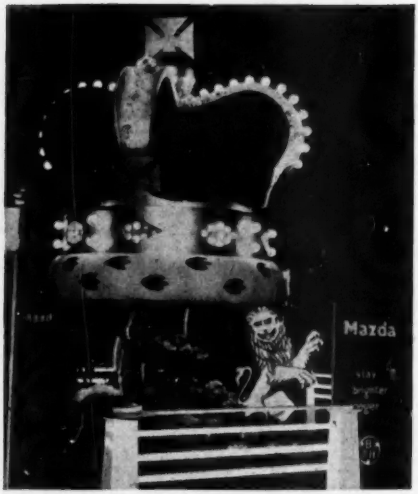
DUE to a last minute alteration on p. 1164 of last week's issue the name of the vice-chairman and his company was unfortunately omitted from the details given of the newly-formed Heat Control Devices Committee. The names left out were those of Mr. E. J. Harris and his company "Diamond H" Switches Ltd.

Workers Share Profits

WE hear that Crompton Parkinson Ltd. are to pay their employees a bonus which will be equivalent to, or above, about two weeks wages or salary. This will be given to all who were in the company's employ on May 29 and who are still employed at the time of payment—the end of this month. Directors have taken this decision in accordance with their usual policy of sharing profits, and in anticipation that overall trading results at the end of the financial year on June 30 will be most satisfactory.

Colour Film for Canadian Campaign

AT the close of the 19th century the newly formed company, R. A. Lister and Co., Ltd., ventured into the Canadian market and achieved considerable success as a pioneer in that country. Now, over half a century later, the same firm is launching another campaign to extend trade in Canada. They are sending a demonstration van to tour the country, exhibiting primarily the Freedom range of diesel engines. Accompanying the exhibits will be the firm's new colour film "The Freedom Range," which was shown for the first time in London last week. This is in the nature of a sales talk and gives a brief survey of the engine's manufacture and assembly, and some of its special features. Particular emphasis is laid on the availability of components and spares, which are standard ised. The numerous applications of the engines in various circumstances, both on land and at sea, are amply illustrated. The film is intended for N. American audiences, but other versions are being made in several languages.



One of the most attractive displays at this year's Royal Tournament was probably that of the B.T.H. Co., Ltd. for Mazda Lamps. The 6 ft high crown towering over the stand and supported by the "royal beasts," was studded with Silverlight and colour sprayed lamps. Stand was enclosed by bars of light provided by multi-coloured fluorescent lamps

Enquiry on Back-Pressure Generation

THE Ministry of Fuel and Power is to initiate a survey to discover the potentialities for back-pressure generation in industry. An announcement to this effect was made by Mr. G. Lloyd in the House on Monday and further details were given at a Press conference the same day. A questionnaire is to be despatched to some 3,000 industrial undertakings this weekend. Each of the concerns consume over 2,000 tons of coal a year and together account for about 30 million tons or 90% of total industrial consumption. Some of the questionnaires will also be sent to non-industrial establishments such as schools and hospitals.

The survey, and the principles of back-pressure generation which are maintained could effect considerable savings and a big contribution towards national fuel economy, has the support of the F.B.I. who have asked members to co-operate. As to the results of the enquiry, it is anticipated that provisional figures will be issued early in the new year, whilst the final results will be published in the Ministry's Statistical Digest for 1953.

Newcomer at Agricultural Shows

ANOTHER mobile exhibition which will be taking its place among many others at future agricultural shows will be the new demonstration unit of Petbow Ltd. In the main the unit will house generating sets suitable for rural dwellers. The ten-ton trailer is 35 ft. long by 8 ft. and there will be five sets in working order at one end—all capable of providing a supply at 240 V, single-phase, 50 c/s. The opposite end of the trailer has been fitted out as a living-room-cum-kitchen and various manufacturers have supplied domestic appliances, such as a cooker, refrigerator, washing machine, radio, kettle and fire.

400 V NOT 230 V

IT has been reported that radio sets burned out, irons scorched clothes and numerous other mishaps occurred when an improved power supply was switched on at the village of Staverton, near Daventry. Cause of the chaos appears to be that an electrician connected across phases and houses received supplies at 400 V instead of 230 V.

NEWS IN BRIEF

H.R.H. the Duke of Edinburgh has accepted Hon. Fellowship of the Institute of Welding. We hear that the Duke was formerly elected to this class of membership by the Council on June 10.

£15 was received by Landwood Distributing Co. Ltd., in their Cake Weight Estimating Competition at the B.E.P.C. Exhibition. That sum has been passed on to swell E.I.B.A. Prizewinner was Mr. N. Phillips of E.D.A.

Four courses on Visual Aids in Industry and Commerce have been arranged by Wandsworth (L.C.C.) Technical Colleges Audio-Visual Centre.

Because of increased demand in the north-east for TV valves and other components the Sunderland factory of Ediswan Ltd. has taken on a further 90 employees. Total employed there now is 1,740.

Electricity in Your Kitchen

A FOUR-COLOUR booklet suggesting ways of laying out or redesigning kitchens to facilitate the maximum saving in labour has just been issued by E.D.A. This is the second brochure of its kind to be produced by the Association in recent months. This latest pamphlet is generously illustrated with photographs of kitchen interiors and domestic appliances as well as plans and diagrams. Particular emphasis is laid on the importance of good lighting and electricity's help towards colour brightness.

Outdoor Switch Fuse

In the notes on the new Ferguson Pailin switch fuse which appeared in our issue of May 28, the eventual range for which new f.p. medium voltage cartridge fuse-links will be available was mis-stated. These fuses which are tested to BS 88: 1952, are expected to be available in ratings up to 800 amp in the near future.

Questions in Parliament . . .

Factory Inspectors

A suggestion that factory workers should be recruited to act as assistants to the factory inspectorate in periods between visits by inspectors was rejected by the Parliamentary Secretary to the Ministry of Labour. The matter, he said, had been considered, but such a scheme, besides requiring new legislation, would also be quite impracticable.

Highland Railways

Lord Malcolm Douglas-Hamilton asked last week whether a conference between the North of Scotland Hydro-Electric Board and British Railways could be initiated to explore the question of electrifying Highland railways. A proposal for such a scheme was made by Inverness County Council recently (see June 4 issue). The Secretary of State for Scotland, to whom the question was directed, had not as yet received the Council's resolution, it was stated, but it was understood that both the Hydro-Electric Board and the Railway Executive had been approached.

Rural Electrification

Information on progress in extending electricity supplies to rural areas continues to be sought, and the latest required (by Maj. Anstruther-Gray) was the percentage of farms in the southern area of the S.E. Scotland Electricity Board which had been supplied. It was stated that 25% of farms in that area had an electricity supply at the end of last month. The comparable figure for the rest of the Board's area was 44%.

Industrial Fuel Efficiency

Another subject debated during the committee stage of the Finance Bill was the question of fuel efficiency in industry. The amendment discussed was to grant a 100% initial allowance in respect of certain types of fuel-saving equipment instead of 40%. Opening the discussion Mr. Crosland said it was almost impossible to satisfy the growing demand for coal and the only way to cope with the situation was to save coal in industry. By and large this required the installation of new equipment and the question was whether the Government could assist. A loan scheme had not proved very popular as only 10% of the £1m allocated had been taken up. Instead therefore of loans it was proposed to have a 100% initial allowance. Mr. Nabarro suggested some form of financial or fixed inducement to secure more fuel efficiency, and Mr. Price said they could encourage by direct tax remissions, such things as better lagging of pipes and improved insulation of roofs.

In his reply to this debate the Chancellor explained new proposals to counter the disappointing reaction to the loan scheme. In the first place the categories of equipment eligible for assistance under the scheme was to be extended, and secondly, the time during which the loans were repayable would be increased, for taxation purposes, for the purchase of fuel-saving equipment up to a maximum of 20 years. In addition the new 20-year loan would be interest free for two years after equipment had been installed, thus allowing time for the equipment to prove its worth. The Amendment was defeated.

Fuel Advisory Service

The Committee set up under the chairmanship of Sir Harry Pilkington to consider a suitable scheme for increased fuel efficiency advisory services to industry, has submitted its report, Mr. Geoffrey Lloyd announced in the House on Monday. Broadly, it is recommended that an independent non-profit-making company, limited by guarantee, should be formed. The British Productivity Council has agreed to inaugurate the body. An annual income of £500,000 will be needed to finance the company, and, said Mr. Lloyd, at the outset the company could expect an income of £450,000 to be provided by the N.C.B., the Gas Council and the B.E.A.—the latter's contribution being £100,000. These sums will be guaranteed for five years, and will be supplemented by fees for services, and, it was hoped, by other voluntary subscriptions. Initial staffing will be by transference of suitable technical personnel from the Ministry of Fuel and Power.

The Minister said he had completed discussions with the industry and the Government would accept all recommendations. Among points stressed in the report was the provision of adequate financial incentives for the installation of fuel saving equipment. The Chancellor had already announced modifications to the existing loan scheme (see above). They were in line with those recommended by the Committee. The Ministry's industrial advisory service will cease to function as soon as the Company has been formed.

P.T. Rebates

When the Committee Stage of the Finance Bill was resumed on Monday one of the subjects discussed was purchase tax relief for retailers on tax-paid stocks. In his reply to the debate, Mr. Boyd-Carpenter said it was not easy to find a solution to the problem but the Government was prepared to consider any proposals put forward. Earlier, speakers had called attention to the substantial losses suffered by retailers, and their refusal to place orders which had a disturbing effect on trade. Sir Harold Webb asked whether reductions could be made in small accounts at unspecified dates.

Machen Power Station

In a written answer on Monday, Mr. G. Lloyd explained that his reason for refusing consent to building a new power station at Machen was purely that disadvantages were considered to outweigh advantages. He was replying to Mr. Palmer

Electric Supply News . . .

Ayrshire

The B.E.A. has now received the formal consent of the Ministry of Fuel and Power to the construction of a new power station at Ochiltree, Cumnock, Ayrshire, which is to be known as Barony power station. This station has been specially designed to burn the slurries and filter cake produced when coal is cleaned at the washeries, much of which has hitherto been regarded as waste. The new station will have two 30 MW turbo-generators and four 150 klb/hr boilers, together with two cooling towers each of 1½ million gal/hr capacity. This is the project to which we have made numerous references during the past 12 months or so.

Croft (Yorks)

The Rural Council is to meet representatives of the North-Eastern Electricity Board to discuss the question of obtaining a cheaper supply of electricity for the proposed new sewage disposal works pumping plant.

Easington (Durham)

The North-Eastern Electricity Board is to take over shortly the distribution system in the Murton area, from the National Coal Board. Tenants of houses are being informed that electrical installations would have to conform to the electricity regulations.

Redditch

The Town Council has been recommended by its Planning Committee to object to a proposal of the B.E.A. to erect pylons for the 275 kV grid line running from Hams Hall to Melksham. The committee objects to the proposal because the pylons would be on high ground known as The Ridgway and be visible for many miles. They consider that they would spoil the view from The Hog's Back, a beauty spot. It is suggested that the line be placed along the valleys of the rivers Arrow and Avon.

LIGHTING SCHEMES

Mansfield.—T.C. is applying for consent to borrow £6,550 for equipment for the second year's stage of the improved lighting scheme.

Perth.—The Roads and Works Committee has decided to convert lighting in Western Avenue from gas to electricity.

Salford.—T.C. has received M.o.T. approval for a £9,000 scheme for new lighting on the main A.6 road from the Swinton and Pendlebury boundary to Manchester.

Sutton Courtenay.—The parish council has received consent to borrow £1,250 for its street lighting scheme.

Sutton and Cheam.—The borough council has received approval to its £8,320 scheme for improving lighting in Central Road, Cheam Common Road, Malden Road, The Broadway, and Station Way.

Company Activities . . .

Aberdare Electric Co., Ltd.

This Irish concern which, among other things, manufactures the "Thermodare" electric storage heater, reports a profit of £52,227 for the year ended March 31 last, after charging depreciation etc. The previous year's corresponding total was £40,161. The dividend is again 8%, but this time on enlarged capital. Details may be released tomorrow, June 26, of the proposed issue £250,000 of 5s. Ordinary shares.

Associated Electrical Industries

The offer last week of £2,205,899 Ordinary £1 stock at £3 15s. each resulted in subscriptions being received for only 30% of the stock offered, leaving 70% to be taken up by the underwriters. In the City this news was not unexpected, in view of the price—but Morgan Grenfell had to pay 72/2½d. per unit for them in New York, it is reported.

Broadcast Relay Services Ltd.

A final Ordinary dividend of 10% tax free on the increased capital is to be paid for the year to March 31 last. With the interim of 8% on the smaller capital, the total distribution absorbs £243,759, compared with a total of 16% for the previous year which took £153,452. The group trading profit for the year ended March 31 last is £1,959,418, as against £1,611,747 for the preceeding year, the respective net profits being £475,564 (*£541,837*), after charging increased taxation, etc.

Calcutta Electric Supply Corpn.

The total number of units sold during 1952—over 963 million—was about 10% higher than in 1951. For domestic sales alone the increase was over 6%. The number also rose by 16,415 to a total of 210,207. The increase in sales is reflected in the revenue, but operating costs were also much higher, but after allowing all charges and payment of dividends (6% tax free) there is £161,233 carried forward. A proposal to take a bulk supply from the Damodar Valley Corporation is referred to on page 1199.

Keith Blackman and Co.

This firm is again paying a final dividend of 12½%, making a total of 25% as before, but this time on doubled capital. The trading profit for the year ended March 31 last, is £413,025—a healthy increase on the previous year's figure of £322,272.

E. K. Cole Ltd.

There is again to be a final dividend of 15%, but this time on the Ordinary capital as increased by a 16⅔% scrip issue. With the interim of 10%, this again makes a total of 25% for the year, absorbing £37,494 compared with £33,083 for the previous year. After charging nearly £100,000 more in taxation, the net profit for the year ended March 31 last, is £134,202 as against £159,215 for the preceeding period.

Garrard Engineering and Manfg. Co.

Ordinary shareholders are being offered 496,472 Ordinary 1s. shares at 2s. each, in the proportion of two new for every eleven held.

Lightfoot Refrigeration

The trading profit for 1952 increased by nearly £16,000 to a total of £57,183. The total dividend is again 6% with a final of 3%.

Mirrlees Watson and Co.

A sharp decrease in the group profit for the year to March 31 last, is reported. At £175,995, the total is £147,775 lower than for the previous year. The former figure has been struck before charging taxation, but after making provision for loss on foreign debts in blocked currency amounting to £61,500 (*nil*). The dividend is maintained at 15%.

Reliance-Clifton Cables and Industrial Products Ltd.

With a final dividend of 20% the total distribution for the year ended November 30 last amounts to 35%—5% more than for the previous year. The group trading profit at £418,683 is £150,305 higher than for 1950-51, and after all charges, including taxation, the net profit becomes £151,966 (*£103,794*). It is proposed that £39,250 be capitalised from general reserve and applied to paying up in full at par £39,250 of the unclassified Preference shares to be issued as 5% Cumulative Preference shares on the basis of one new share for each £4 Ordinary stock held.

E. and H. P. Smith

The dividend for the year ended March 31 last is to be 12½%, the same as before. The profit, before taxation, is £25,445, compared with £30,587 for the previous year.

Southern Areas Electric Corpn. Ltd.

After referring to the acquisition of the whole of the share capital of Tyer and Co., Ltd., railway signalling equipment manufacturers, and to the increase in the group profit for 1952, Sir Arnold Gridley, chairman of the company, indicated the progress of the subsidiary concerns at this meeting on Friday last. For Mawdsleys Ltd. sales for the year were a record, and the works output was some 30% more than in 1951; the business of the Gillott company showed improved results but they were not yet back to the dividend earning stage; while the sales of the products of Ross Courtney were over 30% above those of the previous year.

Siemens Brothers Ltd.

During the last few months there has been a temporary slackening of orders, particularly for telephone exchange equipment from Government Departments, both at home and abroad, General Sir William Morgan, the chairman, states. In some cases orders already placed have been post-dated, while in others schemes for expansion have been deferred. The clarification of the position in regard to the company's holding in Siemens and Halske A. G., is being actively pursued by the company. For the time being it is proposed to retain the sum of £450,000 in the Contingencies Reserve, he adds.

Year to Dec.31	£ Trading Profit	£ Net Profit	% on Ord. Earn'd	% on Ord. Paid	Ord. Price High	Ord. Price Low
1948	1,272,536	431,023	19	7½	36/3	31/3
1949	915,077	465,581	21	7½	36/4	29/3
1950	1,364,603	500,842	35	10	32/-	30/1
1951	1,595,997	579,942	39	10	52/-	31/3
1952	1,817,344	556,425	24	10*	43/6	28/-

*On larger capital.

Ultra Electric (Holdings) Ltd.

This radio firm is raising its dividend by 2½% to 12½% for the year ended March 31 last. The group profit is £175,767 (*£162,385*), but taxation takes £120,966 this time compared with £32,000 a year ago. To assist in financing a new building for research and development, the directors propose to increase the nominal capital from £315,000 to £450,000. Only £50,000 of this new capital will be issued this year.

Walsall Conduits Ltd.

Turnover for 1952 exceeded that of the previous year, but during the second half of the financial year trading conditions changed considerably, from a sellers' to what may be termed a consumers' resistance market, Mr. A. E. Read, the chairman, reports. With the increasingly competitive conditions he feels that it is more necessary than ever that the prices of all basic materials should be substantially reduced. The subsidiary company, A. G. Hackney and Co., Ltd., also suffered a reduction in demand during the second part of the year, to which the import restrictions contributed.

Year to Dec.31	£ Trading Profit	£ Net Profit	% on Ord. Earn'd	% on Ord. Paid	Ord. Price High	Ord. Price Low
1948	372,034	178,041	209	70	62/3	53/6
1949	346,508	147,581	172	70	62/3	51/6
1950	448,838	219,021	270	70	59/-	52/3
1951	502,281	209,434	259	70	64/1	55/-
1952	405,067	159,192	143	70†	47/6	34/1

†On increased capital.

Commercial Information

CONTRACTS OPEN

HOME

June 26.—Tayport (Fife) T.C. Electrical work in erection of 28 houses on Cupar Rd. site. James Gentles and Son, quantity surveyors, Central Chambers, Kirkcaldy.

June 27.—Leven T.C. Installation of 140 W sodium discharge street lighting along trunk road A.915 for about one mile. Burgh Surveyor, Carberry Hse.

June 27. — Thornaby-on-Tees T.C. Installation of electricity in 346 houses and shops at present served by gas. P. Brown, Borough Engineer, Town Hall. Deposit £2 2s.

June 27.—Worksop R.D.C. Supply, erection, etc., of submersible pump and electric motor at waterworks at Blyth. Council Offices, Highfield Hse., 222 Carlton Rd. Deposit £2.

June 29.—Co. Tyrone. Electrical installation in two new schools at Drumquin and Castletown. Munce and Kennedy, Chart. Archs., 133 University St., Belfast. Deposit £3 3s.

June 29.—Failsworth U.D.C. Supply and erection of 80 street-lighting columns in group A, with sodium lamps, lanterns and all auxiliary equipment. Engineer and Surveyor, Town Hall. Deposit £2 2s.

June 29.—Litherland U.D.C. Supply and installation of lanterns, sodium lamps, control gear and concrete columns in class A, along Bridge Rd. Engineer and Surveyor, Town Hall, Liverpool 21. Deposit £1 1s. (See June 11 issue.)

June 29.—Manchester. Electrical installation (phase 2) at Queens Rd. 'bus garage. City Architect, Town Hall. Deposit £1 1s. (See June 4 issue.)

June 29. — Northern Ireland. Electrical installation at Faculty of Agriculture Building, Queen's University, Elmwood Ave., Belfast. Documents from Ministry of Finance (Room 103), Law Courts Building, May St., Belfast.

June 30.—Ashbourne U.D.C. Supply and erection of 114 150 W tungsten lamps and standards. Engineer and Surveyor, King Edward St. Deposit £1 1s. (See May 28 issue.)

June 30.—Belfast. Electrical installation in R.U.C. Barrack and Married Quarters, York Rd. Ministry of Finance (Room 103), Law Courts Building, May St.

June 30.—Dagenham T.C. Supply and erection of 42 group A lighting units along London-Tilbury trunk road. Borough Engineer and Surveyor, Civic Centre.

June 30.—Grimsby T.C. Electrical installation in erection of Western primary junior school at Broadway, Littlecoates. J. V. Oldfield, Borough Engineer and Surveyor, Municipal Offices, Town Hall Sq. Deposit £5.

June 30.—Londonderry. Electrical installation for new X-ray dept. at Waterside Hospital for N.I. Hospitals Authority. W. and M. Given, architects and engineers, 1 Waterside, Coleraine. Deposit £2 2s.

June 30.—Manchester T.C. Electrical installation in 46 police houses on 13 sites. Director of Housing, Town Hall.

June 30.—Skelton and Brotton (Yorks) U.D.C. Supply of electrical fittings for 18 houses on Coach Rd. estate and 6 on Wandhill estate. Engineer and Surveyor, Council Offices, Skelton-in-Cleveland.

July 2.—Alnwick U.D.C. Supply and erection of 41 street lamps along trunk road. Surveyor, Council House, Wagonway Rd.

July 2.—Bottle T.C. Electrical installation in grammar/technical school for boys on New Park Farm site. Borough Surveyor, Town Hall.

July 3.—Gipping (Suffolk) R.D.C. Wiring of 134 houses in various parishes. Engineer and Surveyor, Council Offices, Needham Market, nr. Ipswich.

July 4.—Glendale (Northumb.) R.D.C. Internal electric wiring in 16 houses in Langton Ave., Lowick. Surveyor, Council Offices, Wooler. Deposit £2 2s.

July 4.—St. Neots U.D.C. Supply and erection of 15 concrete columns and lanterns with 100 W tungsten filament lamps, wiring, etc. Surveyor, Council Offices, Huntingdon St.

July 4.—Newburn (Northumb.) U.D.C. Wiring of 19 houses in Whitehall Rd., Walbottle. J. A. Weatherley, Surveyor, Council Offices.

July 6. — Bentley-with-Arksey U.D.C. Supply of lanterns, lamps and control gear, provision of underground cable, and supply and erection of columns and fitting and wiring of equipment for sodium lighting along two miles of Gt. North Rd. Engineer and Surveyor, Council Offices, Cooke St. Deposit £2 2s. (See June 11 issue.)

July 6.—Hazel Grove (Chesh.) U.D.C. Supply and installation of columns, 250 W mercury lighting in Group A along 2 miles of Bramhall Lane and Woodford Rd. Engineer and Surveyor, Council House, Hazel Grove. Deposit £2 2s. (Advertised in this issue.).

July 6.—Northern Ireland. Installation of electrical services in buildings at Holywell Hospital, Antrim. Chief Engineer N.I. Hospitals Authority, 104 University St., Belfast. Deposit £3 3s.

July 6. West Riding. Renewal of electrical installation at Ecclesfield grammar school, County Architect, Bishopsgate, Westfield Rd., Wakefield. Deposit £2 2s.

July 7.—Fife. Electrical work in erection of new high school at Buckhaven. Frank W. Raynes and Son, Consulting Engineers, 40 Second Ave., Cathcart, Glasgow.

July 7.—Hale U.D.C. Supply and erection of concrete columns, lanterns, 150 W tungsten lamps with associated equipment and wiring for Group B street lighting in Delahays Rd. Engineer and Surveyor, Council Offices, Ashley Rd.

July 7.—Stourbridge T.C. Installation of 57 units of Class A street lighting with mercury lamps and concrete columns, and 11 units of same with fluorescent lamps and concrete columns. G. N. Maynard, Borough Engineer and Surveyor, The Council House.

July 10.—Heston and Isleworth T.C. Installation of Class A

lighting along about a mile of Staines Rd., comprising removal of columns and lanterns, supply and erection of 49 steel columns, with lanterns 3/80 W 5ft. fluorescent tubes and control gear. Borough Engineer and Surveyor, 88 Lampton Rd., Hounslow. Deposit £2 2s. (Advertised in this issue.)

July 11.—Longbenton U.D.C. Electrical installation in 180 houses at Burradon. A. E. Sweetman, surveyor, Council Offices, Forest Hall, Newcastle-on-Tyne. Deposit £2 2s.

June 11.—Southport T.C. Installation of electric lighting and heating in 8 shops and 8 maisonnettes on Heathfield Rd. estate. Borough Architect, 93-105 Lord St. Deposit £1 1s.

July 13.—Bromley T.C. Improvement in street lighting in four roads covering about ½ mile. Work includes dismantling and supply and erection of tubular steel columns with 38 enclosed 140 W sodium lanterns and associated equipment. Borough Engineer, Municipal Offices. Deposit £2 2s.

July 13.—Bromley (Kent) T.C. Group A street lighting improvement scheme in four roads, involving re-erecting of existing columns and fixing 38 140 W sodium lanterns. Borough Engineer, Municipal Offices, Bromley, Kent. Deposit £2 2s. (See June 11 issue.)

July 13.—Wallasey T.C. Electrical installation at Leasowe secondary and the Birket primary schools. Borough Architect, Town Hall. Deposit £1 1s. (See June 18 issue.)

July 13.—West Riding. Improvement to existing electrical installation at Todmorden Roomfield secondary school. Also renewal of electrical installation at Thorne Moorends boys' primary school and part renewal of same at Thorne Moorends girls' secondary school. These are separate contracts. County Architect, Bishopsgate, Westfield Rd., Wakefield. Deposit for second contract, £2 2s.

July 13.—Chester T.C. Wiring of Christ Church and Boughton St. Pauls schools, and rewiring of City High school. City Engineer and Surveyor, Municipal Offices. (Advertised in this issue.)

July 17.—Manchester. N.W. Div. of B.E.A. invite tenders for repairs to hyperbolic cooling towers at Stuart St. power station. Divisional Secretary, 825 Wilmslow Rd., Manchester 20. Deposit £2 2s.

July 18.—Prestwich T.C. Supply of equipment for conversion from tungsten filament to sodium vapour lighting along Heywood Rd. Borough Engineer, Town Hall.

July 18.—Whitefield (Lancs) U.D.C. Supply and erection of 73 Group A concrete columns with sodium lamps, lanterns and all auxiliaries, as well as dismantling existing equipment, along Manchester-Burnley (A.56) trunk road. Engineer and Surveyor, Town Hall. Deposit £2 2s.

July 20.—Southport T.C. Alteration and additions to electrical installation and lift at Fairholme, 8 Oxford Rd., Birkdale. Borough Architect, 93-105 Lord St. Deposit £1 1s.

July 21.—Waterford. Supply and erection of pumps and electric motors suitable for 380 V, 3-phase a.c. supply for Tramore water supply scheme. Engineer, Council's Offices, Davitt's Quay, Dungarvan. Deposit £1 1s.

July 29.—Ely (Camb) R.D.C. Electrical equipment for 6 bungalows in The Hithe, 29 houses in Woodfen Drove, and 6 bungalows in Victoria St. (all at Littleport), and 43 dwellings at Sutton and 6 houses at Thetford. Engineer and Surveyor Council Offices, 11 Lynn Rd.

No date stated.—Peterborough. Nene River Board invites tenders for construction of small electrically operated pumping station near Dog-in-a-Doublet Sluices. Apply to Board's Engineer, North St., Oundle. Deposit £3 3s.

No date stated.—N. of Scotland H.-E. Board. Installation of lighting, heating and auxiliary cabling at Errochty Dam Intake and Compensation Turbine House in Tummel Garry project. Marz and McLellan, 72a George St., Edinburgh. Deposit £2 2s.

OVERSEAS

*Details of items marked * may be obtained on application to the Board of Trade, Horseguards Avenue, S.W.1, quoting reference.*

July 15.—Thailand. Royal Thai Irrigation Dept. invites tenders for supply of three 200-kW electric generating sets. Deposit of Baht 2400os. B.o.T. (Ref.: CRE 20743/53)*.

July 31.—India. Tender No. T.3/S-80 calls for supply of 100 kVA, 50 kVA and 25 kVA distribution transformers for Barejadi and Anand substations. Chief Engineer, Electric

Your Queries — Answered

"Teledim" dimmers, makers of? W.E.—A. E. Sommers and Co., Ltd., 96a Sydenham Road, London, S.E.26. (23129)

"Matchless" kettles, makers of? T.E.—Falk Stadelmann and Co., Ltd., 91 Farringdon Road, London, E.C.1. (23136)

"Bell-Howell" projectors, makers of? T.B.—Bell and Howell Ltd., 17 Hanover Square, London, W.1. (23142)

"National" vacuum cleaners, makers of? W.P.—National Utilities Ltd., 8 South King Street, Manchester 2. (23150)

"Verona" irons, makers of? S.W.—These were supplied by Jabez Bate and Co., Ltd., a firm which went out of business over a year ago. There are no manufacturer's spares which are known to be available. (23158)

Electronic potentiometers, makers of? M.L.—Mullard Ltd., Century House, Shaftesbury Avenue, London, W.C.2; Unicam Instruments (Cambridge) Ltd., Arbury Works, Arbury Road, Cambridge. (23166)

"Invicta" sewing machine motor, suppliers of? S. H.—London Commercial Electrical Stores Ltd., 20 Cursitor Street, E.C.4. (23170)

The above are selected from questions we have answered this week. If you have a query, send it to us.

ANSWER WANTED

M.E.S. lampholder marked E.S.E. Eng., makers of?—F.T. (23173)

Contracts Open—Overseas —continued

Grid Offices, Mercantile Bank Building, Fort, Bombay. B.o.T. (Ref.: CRE 20358/53).*

Aug. 4.—India. Supply and erection under Spec. No. E-203, of outdoor and indoor switchgear equipment for substation covered by Salem-Namakhal 110 kV extensions, for Madras Electricity Dept. Tenders to Superintending Engineer, Technical (Electrical), 157 Mount Rd., Madras 2. B.o.T. (Ref.: CRE 19705/53).*

Aug. 4.—New Zealand. Supply of 60,000 ft. of wire for construction and maintenance of radio transmitting and receiving aerial systems. Wire comprises 30,000 ft. hard-drawn stranded copper wire 7/·044, bare conductors, and 30,000 ft. same 7/·064. Quotation for P and T 150/5817. Director-General (Stores Div.), G.P.O., Wellington.

Aug. 25.—Brazil. Mechanical and electrical equipment for Ernestina Hydro-Electric power station includes hydraulic turbine unit, overhead crane, three-phase alternator, switchboard and transformer equipment, and power station ancillary equipment. Tenders invited by Rio Grande do Sul State Electric Energy Commission, Passo Fundo, Brazil. B.o.T. (Ref: CRE 19264/53).*

CONTRACTS PLACED

Blyth T.C. Supply of electric cookers for housing scheme, £1,272; supply of wash-boilers for same, £412. N.E. Electricity Board.

Chorley (Lancs) T.C. Improved street lighting along Pall Mall and Moor Rd., General Electric Co., Ltd., £3,250.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Brush in design. 701,423. Class 7. Electric alternators, turbines, steam condensers, induction motors, dynamos and electric welding machines. Brush Electrical Eng. Co., Ltd., Falcon Works, Loughborough.

Comet. 714,158. Class 9. Thermometers and thermostats for use with aquariums. James North (London) Ltd., 316 Lee High Road, S.E.13.

PRICE OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	252 0 0	—
LEAD, good soft pig (foreign)	91½-91¾	108 0 0
TIN (99·99·76%) (Cash)	685-687½	—
,, (3 months)	685-687½	—
ALUMINIUM, commercial purity (del.)	161 0 0	—
ZINC	72½-73	88 0 0
ARMOURING:		
Galv. Steel Wire (0·104 in.)	51 10 0	—
Mild Steel Tape (0·04 in.)	40 0 0	—

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London W.C.2.

J. S. Bacon Ltd., Cornubia Works, Moorland Rd., Par, Cornwall. To take over business of electrical contractor carried on by John S. Bacon at Par. Nom. cap.: £100. Dirs.: J. S. Bacon and Mrs. M. M. Bacon.

J. H. Boddy (Stockwell) Ltd., 819 Fulham Rd., S.W.6. Wireless engineers and contractors, etc. Nom. cap.: £3,000. Dirs.: J. H. Boddy, Gladys E. Boddy, and R. M. Boddy.

Criterion Radio Vision (Leicester) Ltd., 21 Friar Lane, Leicester. Manufacturers of and dealers in electrical and mechanical apparatus and accessories, wireless and television sets, etc. Nom. cap.: £3,000. Dirs.: W. Taylor and Mrs. D. M. Taylor, and A. A. Swain.

Jack H. Ford (Shoreham) Ltd., 31B Chapel Rd., Worthing, Sussex. Electrical engineers and contractors, etc. Nom. cap.: £1,000. Dirs.: J. H. Ford, Mrs. D. E. Ford and R. Rowling.

Ian McPherson and Co. (Auto Engineers) Ltd. Motor and electrical engineers, etc. Nom. cap.: £500. Dirs.: N. Brindle, Oaklyn, Inglewhite, Goosnargh, near Preston; I. R. McPherson, 97 Lowther Rd., Prestwich, Manchester; C. F. Cross and A. Storey.

Number Nine Motor Accessories Ltd. Manufacturers of and dealers in motor car lamps, electric bulbs, clocks, mats and rugs, etc. Nom. cap.: £5,000. Dirs.: F. Davis, 55 Waldegrave Park, Twickenham, Mdx., and K. C. Saltrick, 5 Holcombe Road, Ilford.

Parsons, Riley and Co. Ltd. To take over business of radio, television and electrical contractors and dealers carried on as "Parsons, Riley and Co." at 11a West Way, Botley, Oxford. Nom. cap.: £4,250. Permt. dirs.: E. W. Parsons, 12 Radley Rd., Abingdon, Berks.: and J. Riley, 8 Raleigh Park Rd., Botley, Oxford.

W. A. Phillips and Sons Ltd., The Bridge, Cowbridge, Glam. To take over business carried on at Cowbridge by W. A. Phillips and Sons: heating, lighting, ventilating, domestic and general engineers, etc. Nom cap.: £6,000. Dirs.: H. L. Phillips, A. L. Phillips, and R. G. Phillips.

Rent-A-Lite (Mayfair) Ltd., 16 Manchester Sq., W.1. Electrical, radio, radar, television, electronic, mechanical and optical engineers, etc. Cap.: £500. Dirs.: L. S. Brace and Mrs. R. M. Brace.

Rothery Services Ltd., Middlehurst Av., St. Helens, Lancs. Wireless, television, electrical, motor, refrigeration, lighting, telephone, mechanical and general engineers, etc. Nom. cap.: £2,000. Dirs.: not named. Subs.: Nora Bentley, 4 Benns Av., Blacker Rd., Birkby, Huddersfield, and Margaret H. Garside, Highfield Farm, Slaithwaite, nr. Huddersfield.

Sydun Conveyor Manufacturing Co. Ltd., Ling House, Dominion St., E.C.2. Engineers, founders, smiths and machinists, electricians, manufacturers of and dealers in electrical apparatus, etc. Cap.: £100. Dirs.: N. J. R. Simons and C. S. J. Dunckley.

A. A. Swain Ltd., 27 Friar Lane, Leicester. Manufacturers of and dealers in electrical and mechanical apparatus and accessories; wireless sets, etc. Cap.: £100. Dirs.: W. Taylor and A. A. Swain.

Tewbo Engineering Ltd., 220b West End Lane, N.W.6. Heating and lighting specialists, engineers, etc. Cap.: £1,500. Dirs.: J. Kobler and A. Scheige.

BUSINESS PROSPECTS

Aberdare U.D.C. Erection of 13 blocks of (52) flats at Llettyshenkin, Cwmbach. Engineer and Surveyor, Vestry Hall.

Alnwick (Northumb) R.D.C. Scheme in hand to build further 98 houses on Hillcrest site, Shilbottle.

Ashby-de-la-Zouch R.D.C. Approval granted for erection of 96 houses on Pegg's Close site.

Barry (Glam) T.C. Scheme to be prepared for 50 old person's dwellings on various sites.

Bath T.C. Construction of 20 dwellings on Moorlands estate. City Planning Officer and Architect, 7 North Parade Buildings.

Belfast. C. and A. Modes Ltd. are to build six-storey premises in Donegal Place. Estimated cost is £250,000, and quantity surveyors are W. H. Stephens and Sons, 13 Donegal Sq. North, Belfast.

Bentley (Yorks) R.D.C. Further 50 houses to be built off Askern Road.

Billingham-on-Tees. Council Surveyor has prepared plans for two further sites on Roseberry Rd. estate providing for 417 houses.

Bridgnorth (Salop) T.C. It is proposed to build 60 houses at Highley.

Bristol. Additional accommodation is being planned for Rose Green High School and Upper Horfield Primary School.

Brownhills (Staffs). H. Holland, 38 Edward St., West Bromwich, is architect for factory in Lichfield Rd., being planned by Perfichrome Ltd., St. John's St., Lichfield.

Burnley (Lancs). All trades for extensions and alterations to St. John's R.C. primary school in Ivy St. Borough Engineer and Surveyor, 22-24 Nicholas St.

Camberwell B.C. Construction of 108 flats in Croxted Rd., Town Clerk, Town Hall, Peckham Rd., S.E.5.

Cheltenham T.C. Stage 7 of Elm Farm scheme will comprise 280 houses and 164 flats.

Cheshire. First instalment of Mid-Cheshire (Hartford) Central College of Further Education, estimated to cost £150,000. has been included in 1954 programme. New secondary school at Hartford has also been included in same programme.

Chesterton (Staffs). Thomas and Evans Ltd., Porth, Rhondda, propose to extend their factory in Sandford St. Architects are Watkin, Willis and Cooper, National Provincial Bank Chambers, Burslem, Stoke.

Chingford (Essex) T.C. Erection of 24 houses on Gommes Farm site. Borough Engineer, Town Hall, E.4.

Coatbridge (Lanark) T.C. Application to be made to borrow £115,282 for Kirkshaws housing scheme (second development); £80,419 for 50 houses in Woodside scheme; and £107,982 for 66 houses on Kirkshaws housing scheme No. 1.

Darlaston (Staffs) U.D.C. It is proposed to build 114 dwellings in Foundry St.

Dodworth U.D.C. Erection of 72 houses on South Rd. site. Council's Architects, Howard and Benson, 88 Mosley St., Manchester.

Dumfries. Approval sought for extensions to Kellsholm school, and also for alternative sketch plan for primary school at Troqueer.

Dungannon U.D.C. Site plans approved for new fire station in Thomas Street.

Eccles T.C. Construction of 84 flats in four blocks on Old Mill site in Church St. Borough Engineer and Surveyor, Town Hall Annexe.

Gateshead. Work expected to begin soon on factory additions at Team Valley for Square Grip Reinforcement Co., Ltd. Architects are Cordingley and McIntyre, The College, Durham.

Hatfield (Herts). Construction of 307 dwellings at Area 1, Hatfield Hyde. Quantity surveyors are C. E. Ball and Partners, Dilke House, Malet House, W.C.1.

Hemel Hempstead. Tenders being invited for erection of junior infants' school in Chambersbury Lane.

High Wycombe (Bucks) T.C. Erection of 106 dwellings on Hatters Farm estate. J. A. Parkinson, Borough Engineer and Surveyor, Municipal Offices.

Hornsey (Middx). Tenders may soon be invited for rebuilding of St. George's Church Hall in Park Rd. at cost of £13,000.

Keighley (Yorks). New Highfield secondary school is being planned for site near Braithwaite Open Air school.

Lancashire. Construction of following secondary schools: Middleton Langley, Lytham St. Annes, Great Crosby, Kirkby, Whitefield Higher Lane, Droylsden Littlemoss, and phase 1 of Leyland Earnshaw Bridge. County Architect, County Hall, Preston.

Llanelly R.D.C. Erection of 34 houses in Llethry Rd. Architect's Office, 12 Station Road.

London. Scheme approved for erection of 14-storey building near Queen Victoria St. Architects are Campbell, Jones and Sons, 9 Dowgate Hill, E.C.4.

Milngavie (Dunbarton) T.C. Approval given to erection of 50 houses in burgh for Scottish Special Housing Assoc.

Newcastle-on-Tyne. Additional storey to be built at south block of Medical School at King's College. Also additions planned at Church High school. Architects for both are Newcombe and Newcombe, 23 Eldon Square.

Newport (Mon) T.C. Approval sought for first instalment of technical college at Allt-yr-yn, at estimated cost £200,000. Approval also sought for electrical installations at Stow Hill Baths.

Nottingham. Application to be made to borrow £196,300 for erection of Peveril secondary school in Aspley Park Drive, and £92,220 for Milford infant and junior schools on Clifton estate.

Oldham T.C. Erection of 44 aged persons' bungalows on Holts estate. Cameron and Middleton, chart. quantity surveyors, 21 Queen Street.

Penrith. W. Binney, architect, Appleby, Cumberland, has prepared plans for community centre including dance hall, concert hall, swimming pool, exhibition gallery, etc.

Ripon (Yorks) T.C. A. Schofield (Builders) Ltd. of Hornsea, have been invited to build 121 houses on Lead Lane site, and Ripon Federation of Master Builders and Gibson Bros. to erect 99 houses on same site, phase 2.

Seaton Valley (Northumb) U.D.C. Ministry approval sought for erection of 60 houses at Cramlington.

Scunthorpe. Sheffield Hospital Board are considering scheme for additional floor to Coronation block at War Memorial Hospital.

(continued on page 1220)

Business Prospects—continued

Sherborne (Dorset) U.D.C. Erection of 30 houses in Harbour Rd. Petter Warren and Roydon Cooper, The Old Oxford Inn, West Hendford, Yeovil.

Southwark. Architects for provision of additional storey for Keliher, Hudson and Kearns Ltd. are Yates, Cook and Darbyshire, 43 Great Marlborough St., W.1.

Stamford T.C. It is proposed to build further 48 houses to complete Drift Rd. estate after allowing sites for shops and church hall. Also scheme has been approved for wiring all 1919 and 1924 council houses still without electricity.

Stoke-on-Trent T.C. Application to be made to borrow £79,704 for erection of Brookhouse Green primary junior school.

Strood (Kent) R.D.C. Construction of 148 houses at Hoo. Engineer and Surveyor, Council Offices, Frindsbury Hill.

Sydenham (Kent). E. C. Pinks and Partners, Parliament Mansions, Victoria St., S.W.1, have been appointed quantity surveyors for erection of 30 flats and 26 houses on Bridge House estates.

Tullamore (Eire) U.D.C. Erection of 110 houses. Town Clerk, Courthouse.

Walsall T.C. Construction of block of 20 flats and shop at St. Matthew's Close. G. A. Jellicoe, Architect, 12 Gower St., W.C.1.

West Riding. Erection of 20 houses and two offices as police premises in various districts. County Architect, Bishopgarth, Westfield Rd., Wakefield.

OVERSEAS

U.S.A. Technical Service Co., 730 Haines Ave. N.W., Albuquerque, New Mexico, wish to represent U.K. manufacturers of phase converters, street lighting equipment, ohm meters, diesel pumps and generators, fractional h.p. motors, and compressors.

U.S.A. Tenders expected to be invited soon for supply to City of Centralia of a hydro-electric generator, 6,250 kVA, 80% power factor, 400 r.p.m. Vertical shaft, 2-guide bearing, 2,400 V, 60 c/s.

GAZETTE ANNOUNCEMENTS

COMPANIES ACTS

Edmund Bassett and Son Ltd. Meetings of creditors and contributories will take place at Inveresk House, (Room 401), 346 Strand, W.C.2, on June 29 at 10.15 a.m. and 10.45 a.m. respectively.

G. E. Collinge and Co., Ltd. Resolution passed at meeting on June 6 for voluntary winding-up. A. Rothburn of Atlantic Chambers, 7 Brazenose St., Manchester, was appointed liquidator.

Edstone Ltd. Creditors are asked to send particulars to liquidator, K. D. Haynes, Cert. Acc., 7 Great Castle St., W.1, by July 31. Company is being voluntarily wound up.

Koldec Ltd. L. J. Hutchinson, 12 Kingsley Gdns., S. Chingford, London, has been appointed liquidator by members.

Pier Electrical (Brighton) Ltd. Resolution for voluntary winding-up passed at meeting on June 11 when J. S. Bradley-Hole of A. E. Orbell and Co., 7 Old Steine, Brighton, was appointed liquidator. Creditors are asked to send particulars to him by July 17.

Refrigeration EnterpriseCo., Ltd. Meetings of members and creditors will take place at 93 Queen St., Sheffield, on July 28 at 11.30 a.m. and 12 noon resp.

BANKRUPTCY ACTS

Receiving Order

Chester. Frederick E. L. Hester, electrical contractor, trading at 9 Coal Exchange, Black Diamond St., Chester. Date of order, June 13.

First Meeting

Barnstaple. Arthur C. Snow, trading as A. C. Snow and Co., mechanical and electrical engineer, at 47 High St., Barnstaple. First meeting will take place tomorrow (Fri) at Guildhall, Barnstaple, at 2.30 p.m., and public examination at same address on July 7 at 12 noon.

Application for Discharge

Croydon. Sidney D. Bennett, electrical engineer, trading at 2 Burnt Ash Parade, Lee. Hearing fixed for 11 a.m. on July 30 at County Court, Scarbrook Rd., Croydon.

Release of Trustee

Manchester. Fred Jones and B. P. Callaghan trading together as Jones and Callaghan, electrical engineers and sheet metal workers, at 2 Farm Yard, Levenshulme. Trustee was F. C. Ormrod, Official Receiver, 20 Byrom St., Manchester.

Order on Application for Discharge

Brentford. David J. Chambers and William Mackett trading together as I.D.C. Electrical Appliances at 15-17 High St., Hounslow. Order made on May 15. Discharge suspended for four months and that he be discharged as from Sept. 15, 1953.

Intended Dividends

Lincoln. John L. Parker, electrician trading at 15 West St., Horncastle. Last day for receiving proofs, June 30. Trustee is E. C. Stimpson, Official Receiver, 22 Regent St., Park Row, Nottingham.

Dividends

Grimsby. Kenneth G. Rudd, electrical contractor trading at 4 Commercial Rd., Louth, Lincs. First and final dividends of 4s. 11d. payable today (Thurs.) at 26 South St. Mary's Gate, Grimsby.

York. George H. Battye, electrician, trading as G. H. Battye at Clifton Rd., Pudsey. First and final dividends of 7½d. in £ payable at Official Receiver's Office, 29 East Parade, Leeds, on June 30.

TRADE NOTES

Acquisition. The business of Suffields Radio and Television, Ltd., of 135 High Street, and 14 Poplar Road, King's Heath, Birmingham, has been acquired by Hadley Bros. (Radio and Electric), Ltd. This brings to a total of eight the number of retail branches operated in the Birmingham area by Hadley Bros. The two new branches will conform to the others and be known in future as Hadley Bros.

Changes of Address. The London office of Newman Industries, Ltd., has moved to Terminal House, Grosvenor Gardens, S.W.1. Telephone: Sloane 8206.

The sales office of Aluminium Wire and Cable Co., Ltd., is being moved from Thurloe Street, London S.W.7, to new and larger premises. From Aug. 15 all communications should be addressed to 30 Charles II Street, St. James's Square, S.W.1. Telephone: Trafalgar 6441/6.

Trade Notes—continued

The partnership between R. Homes and E. Cooke-Yarborough, under the style of Cone Fittings Co. has been incorporated into a limited company. The concern has also moved to 9 Rosemont Road, Hampstead, N.W.3. Telephone: Hampstead 6618.

Expansion. Electrothermal Engineering Ltd. have commenced production in a unit they have acquired at Hamlet Court Road, Westcliff-on-Sea. This will enable the company to add to its range of products. The head office remains at 270 Neville Road, E.7, where the Development Department and certain manufacturing processes also operate.

Distributors. Anglo Netherland Technical Exchange, Ltd., 3 Tower Hill, E.C.3, have been appointed sole distributors of the "Oryx" soldering instruments.

New Branch. Kelly and Shiel, Ltd., of Dublin, have purchased showroom and warehouse premises at Drawbridge Street, Cork, where the branch manager is Mr. A. W. Dunlop.

MEETINGS TO NOTE

TUESDAY, JUNE 30

A.S.E.E. (Bournemouth Branch) "Modern Fixing Practice." R. P. Dunn. Grand Hotel, Firvale Rd., 8.15 p.m.

WEDNESDAY, JULY 1

A.S.E.E. (N. London Branch) "Safety Regulations." F. Clarke. The Queens Head, 677 Green Lane, Harringay, N.4, 7.45 p.m.

EXHIBITION DIARY

Royal Highland Agric. Show. Is being held at Alloa between June 23 and 26.

Brit. Instrument Industries Show will open at Olympia on June 30 and close on July 11.

W. T. HENLEY'S TELEGRAPH WORKS COMPANY

American Cable Contract Obtained

THE annual general meeting of W.T. Henley's Telegraph Works Company was held on June 19 in London.

Sir John Dalton, A.M.I.E.E., F.C.I.S., the chairman, presided.

The chairman, in the course of his speech, said:

The net current assets—that is, the current assets less the liabilities—are £6,612,000, or some £2,400,000 more than at the end of 1951.

The market value of our trade investments exceed their book value by almost £1,000,000.

The balance in our trading account for the year is £1,364,135, which is within £5,000 of the balance in 1951.

The net profit of the parent company for the year at £594,554 shows an increase of £60,391 over the previous year, that is, an increase of 11·3 per cent.

We have transferred £300,000 to general reserve, the total of which reserve now stands at £3,100,000.

It is proposed to pay a final dividend of 8 per cent. which, together with the interim dividend of 5 per cent. already paid on the £2,437,000 of Ordinary stock, becomes equivalent to 10½ per cent. on the Ordinary stock issued at the end of the year.

Our subsidiary companies—Henley's (South Africa) Telegraph Works Company, Ltd., and Oakley Brothers, Ltd.—both showed expansion during the year. Our other subsidiary—Henley's Tyre and Rubber Company, Ltd., however, suffered a setback in common with a serious recession in the tyre industry generally.

Commercial Aspects

There is no doubt that 1952 saw a change in the business outlook. It witnessed the end of a long period of booming trade conditions in most overseas markets, and at home a slackening of activity in many industries which broadened as the year advanced into something of a trade recession.

Now, in my view, it is not for Henley's to fear competition. It puts us on our mettle, and, as an example of the attitude taken up by your company in these changed circumstances, you may have noticed that we tendered for and obtained a contract in America a few weeks ago for the Seattle City Light Department against tenders from both British and American cable makers. We were nearly £20,000 under the nearest American bid.

Exports

Exports represent an important part of our business but, during 1952, we were handicapped both by copper rationing and the restrictions upon imports imposed in our principal overseas markets. Nevertheless our export sales increased in relation to 1951 by approximately 10 per cent.

Future Prospects

The special problems which we face today are in the nature of things unusual and transitory, but they have a bearing on the immediate future. Impediments to progress, outside our control, arise from a variety of causes. Financial stringency overseas and credit restrictions at home have resulted in our company being obliged to accept deferred payments or asked to delay shipments and, indeed, at home we have found ourselves financing other industries to a certain extent. There was an overstocking of cables by the nationalised and other industries during the time of scarcity, and we now await the re-entry into the market of our larger buyers as soon as current stocks of cable are run down.

On the other hand we should perhaps, as an industry, count our blessings. We are linked inevitably with the great electrical industry of this country.

There can be no doubt that the major industries of this country must utilise more and more electrical energy if we are to meet the ever increasing keenness of foreign competition in world markets. The British Electricity Authority is fully alive to this necessity and is planning accordingly.

Thus there must be a continued and even expanding demand for our products. There is already a pent-up demand awaiting release as our more urgent national problems become solved.

The report was adopted.

TELEPHONE RENTALS LTD.

Another Successful Year. Hampering Effect of Delayed C.I.C. Decision

THE 24th annual general meeting of Telephone Rentals Ltd., was held on June 22, in London, Mr. Fred T. Jackson, O.B.E., comp.I.E.E. (chairman and joint managing director), presiding.

The following is an extract from his circulated statement:

Once more we have had a very successful year, and the forecast I made at our last general meeting of the profits for the year 1952, has been exceeded.

The profit for the year ending December 31, 1952, amounted to £616,886, after charging £58,114 for employees' participation scheme. This shows an increase in gross profit of £151,303 over the year ending December 31, 1951. I am sure you will agree that this is most satisfactory.

The result achieved was in spite of the difficulties we had to surmount during the past year, which necessitated some restrictions on taking new business; nevertheless, we succeeded in increasing our annual rental by £157,131.

As you know, the nature of your company's business is such that it requires additional capital from time to time. The amount we can afford to spend out of our liquid resources on new installations is dependent on the margin left after meeting taxation and dividends to shareholders.

With taxation at its present level, it is a matter for serious consideration by your directors as to whether it is worth while continuing to develop the business, in view of the difficulty of finding the liquid funds to meet the tax liabilities. We can now take into consideration the statement of the Chancellor that the Excess Profits Levy will be abolished at the end of 1953, but nevertheless, our liability for this tax in respect of the current year will be a very considerable sum. We therefore feel that we should exercise prudence and still restrict our activities to a certain extent, so that in 1954 we should be in a position to go ahead with the further development of the business.

It has always been the aim of your directors to build up the financial strength of your company, and I think that up to the present time this policy has been successful, inasmuch as the profit-earning capacity and the dividend record over many years past has been such that would merit your company's shares being designated one of the "Blue Chips" investments in Industrials.

Bonus Issue of Shares

At an extraordinary general meeting held on May 6, 1953, authorisation was given for the capitalisation of part of the share premium account by the issue of 1,120,000 fully paid Ordinary shares of 5s. each in the proportion of one share for every 4·714 shares held, and these shares will rank for the final dividend for the current year under review.

This continues the policy initiated in 1951 when a bonus issue of one in ten was made, and although I am unable to prophesy that further bonus distributions will be made, it is reasonable to expect that there will be further distributions in the future, if the company continues to expand as satisfactorily as it has done in the past.

Subsidiary Companies

The company's main operating subsidiary in South Africa has had a most successful year and is now making substantial profits. We have, therefore, taken the opportunity of writing off the goodwill of £16,961 which appeared in that company's balance sheet.

All the other subsidiaries of your company traded at a profit in 1952.

Accounts

Profit and loss account: After making provision for taxation amounting to £405,282, the transfer to general reserve of £100,000, and the dividends on both Ordinary and Preference shares amounting to £85,350, net, which includes the final dividend in respect of the recent bonus issue, we are left with an unappropriated balance of £122,685 to be carried forward.

Balance Sheet: Taking the capital reserves first, you will see that the share premium account has increased by £41,702 to £291,032, as a result of the share issue made in December, 1952. This account has since been reduced by £280,000 by the issue of the fully paid bonus shares referred to above, and will be reduced further by the costs of the issue, when known. The only other movement in the capital reserves has been to increase the surplus on realisation of capital assets by the sum of £2,056, as a result of company-owned houses having been sold.

Under revenue reserves you will see that the general reserve has been increased by a further £100,000, bringing the total up to £650,000, which, together with the contingencies reserve of £50,000, makes a total of £700,000.

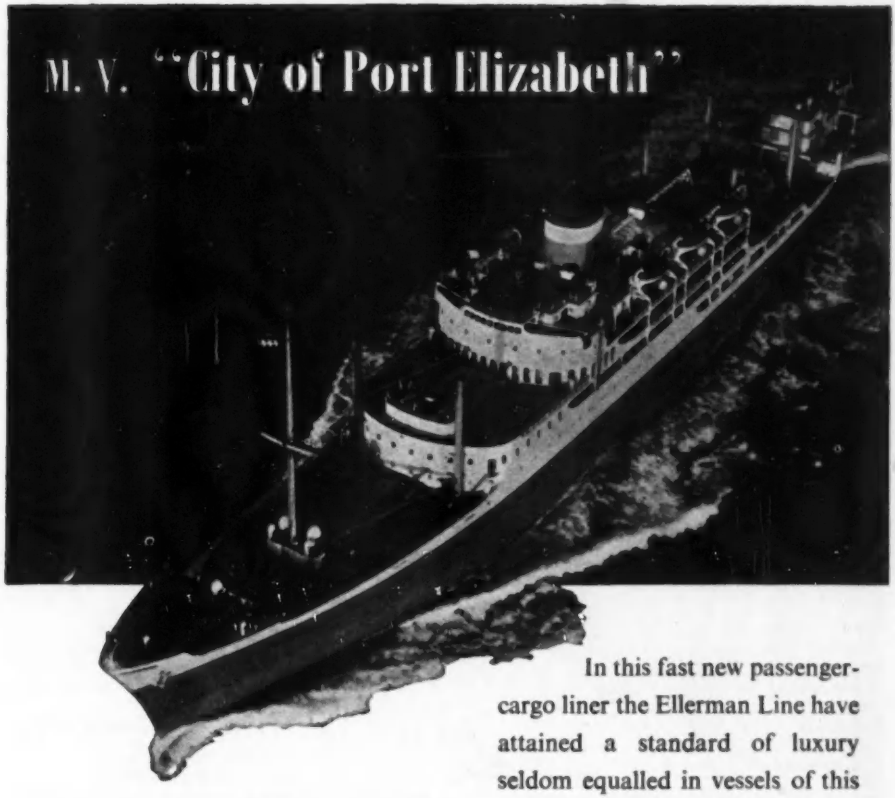
The net profit of the group before taxation is £667,068, compared with £495,751 for 1951. After providing for taxation, the transfer to reserve and dividends the balance of unappropriated profits carried forward and attributable to the holding company's shareholders amounts to £160,998.

In conclusion, I would like to say that the year 1952 for your company was one of the most difficult in its whole history. The restriction on bank loans, and the refusal of the C.I.C. in the early part of the year to grant us permission to secure additional capital, brought our expansion programme to a halt, and seriously hampered our activities, and the fact that we ended the year with such excellent results reflects great credit, firstly, upon the staff of all ranks for the excellent way in which they rallied round the company and performed their work in very trying circumstances, and, secondly, to the directors, who refused to accept the decision of the C.I.C. and persisted in their efforts until the necessary sanction for a capital issue was given.

Although we are obliged to continue to work in a restricted field, nevertheless I look forward to the continued prosperity of your company in the current year.

The report and accounts were adopted and the final dividend of 6%, making 10% for the year, was approved.

M. V. "City of Port Elizabeth"



equipped throughout with

HENLEY

SHIPWIRING CABLES

In this fast new passenger-cargo liner the Ellerman Line have attained a standard of luxury seldom equalled in vessels of this type. Specially designed for the South African service, and bearing the name of the Union's third port, the City of Port Elizabeth should greatly enhance the Company's reputation.

Builders:
Vickers-Armstrongs Ltd., Walker-on-Tyne

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53 HATTON GARDEN, LONDON, E.C.1

THERE'S SALES VALUE in a Metrovick Motor

Squirrel-cage and DC motors ranging from 1/50th to 1 h.p. are available for immediate delivery. Write for full details of the Metrovick range.

To the public, as well as to the engineer, Metrovick is a name to be trusted. When specifying fractional-horsepower motors for washing machines, refrigerators and other domestic or light industrial equipment choose Metrovick. The name guarantees trouble-free service and provides you and your retailers with a first-class sales feature.

METROPOLITAN-VICKERS ELECTRICAL COMPANY LIMITED · TRAFFORD PARK · MANCHESTER, 17

Member of the A.E.I. group of companies

METROVICK *Fractionals Serve and Sell*

JQo 1/3

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WORK WANTED WANTED · FOR SALE

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

BOROUGH OF HESTON AND ISLEWORTH

Staines Road, Hounslow, A.315.

STREET LIGHTING IMPROVEMENT

THE BOROUGH COUNCIL invite Tenders for the installation of new street lighting to Group "A" standard, along a section of the Staines Road, Hounslow, for a distance of approximately 1,600 yards.

The work includes:—

(a) Taking down of existing columns and lanterns.

(b) Supply and erection of 49 steel columns, and

(c) Supply and fitting of 49 lanterns containing 3/80 W 5-ft. fluorescent tubes, together with necessary control gear.

Specification, bills of quantities and forms of tender can be obtained from, and the drawings and conditions of contract inspected at the office of the Borough Engineer and Surveyor, 99 Lampton Road, Hounslow, on payment of a deposit of two guineas which will be refunded on receipt of a bona-fide tender not subsequently withdrawn.

Tenders, enclosed in a plain sealed envelope endorsed "Staines Road Street Lighting," but bearing no indication of the name or address of the sender, must be delivered to the undersigned not later than 10 a.m. on Friday, July 10, 1953.

The Council do not bind themselves to accept the lowest or any tender.

HAROLD SWANN,
Town Clerk.

Council House, Hounslow. (E 204)

CITY OF CHESTER

ELECTRICAL WIRING—SCHOOLS

THE CORPORATION invites Tenders for the following work to be carried out during the summer holidays—August, 1953.

(1) Wiring Christ Church School.

(2) Wiring Boughton St. Pauls School.

(3) Rewiring Ground Floor—City High School.

Tender documents can be obtained from the City Engineer and Surveyor, Municipal Offices, Chester.

No tender will be accepted unless it is in a sealed envelope suitably endorsed and delivered to the undersigned not later than 9.0 a.m. on Monday, July 13, 1953. The Corporation does not bind itself to accept the lowest or any tender.

G. BURKINSHAW,
Town Clerk.
(E 213)

HAZEL GROVE AND BRAMHALL URBAN DISTRICT COUNCIL

ROUTE A.5102. IMPROVED LIGHTING SCHEME

Bramhall Lane South and Woodford Road (part), Bramhall

TENDERS are invited for the supply and installation of the necessary reinforced concrete or steel columns, lanterns and accessories in connection with the provision of improved lighting to Group A Standard by 250 W horizontal burning mercury-vapour lighting equipment on approximately 2 miles of Class 1 road. Contractors desiring to tender should submit their names with a deposit of £2 2s. (returnable upon receipt of a bona fide tender) to the Engineer and Surveyor, at The Council House, Hazel Grove, Cheshire, not later than July 6, 1953.

The Council does not bind itself to accept the lowest or any tender.

F. E. CAPPER,
Clerk of the Council.
(E 238)

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

EASTERN ELECTRICITY BOARD

Chilterns Sub-Area

GENERAL ASSISTANT ENGINEER
Northwood District

CANDIDATES should have had a sound training in electrical engineering and experience of the construction, operation and maintenance of l.v. and h.v. underground systems including substations.

The salary for the appointment will be in accordance with Class "E," Grade II, of the National Joint Board Salary Agreement, commencing at £524 p.a., plus London Weighting. Both future salary and conditions of service will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidate will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Applications by letter stating age, education, qualifications and experience, with details of present appointment and salary, should be submitted to the District Manager, Northwood, Eastern Electricity Board, 1 Love Lane, Pinner, Middlesex, within 14 days of the appearance of this advertisement. (E 214)

BRITISH ELECTRICITY AUTHORITY

South Eastern Division

ASSISTANT SHIFT CHARGE ENGINEER, Croydon "B" Power Station. Applicants should preferably possess technical qualifications equivalent to graduate membership of either the Institution of Mechanical or Electrical Engineers. Experience in the efficient operation of modern high-pressure power station plant with p.f. firing and experience in the administration and control of labour essential. N.J.B. conditions of service and salary Class "J," Grade 9, £754 19s. per annum including London Allowance.—Applications, giving details of education, present position, experience etc., should be received by the Station Superintendent, Croydon "B" Power Station, Beddington Farm Lane, Purley Way, Croydon, Surrey, by not later than July 4. (E 215)

SOUTH EASTERN ELECTRICITY BOARD

TWO ASSISTANT ENGINEERS (SUB-STATION)
Orpington Capital Sub-station

SALARY £577 to £598 plus London Weighting under N.J.B. Schedule, Class "F," Grade 10. Superannuable. A sound technical training is essential and preference will be given to persons with practical experience in the operation of a large sub-station involving transformation from 66 to 33 kV and 33 to 11 kV, having some knowledge of protective gear, and who are conversant with the operation of interconnected systems. The appointment involves shift duties.

Applications on forms obtainable from T. A. D. Honnor, M.I.E.E., Croydon and West Kent Manager, SEEBoard, Electric House, Wellesley Road, Croydon, Surrey, to be returned, giving two referees, by July 7, 1953.

A. L. BURNELL,
Secretary.
June 19, 1953. (E 225)

YORKSHIRE ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

No. 5 (Wakefield) Sub-Area

Castleford District

CONSUMERS' ENGINEER

Applicants, who must have had a sound practical training and considerable experience in the work of a Consumers' Engineer, will be required to give advice to all classes of consumer concerning the utilisation of electricity.

Experience is required in negotiations for supply; the interpretation and application of the I.E.E. Wiring Regulations and other regulations concerned with the testing and inspection of consumers' installations; tariffs; sales development; the control of staff and manual workers.

Salary: N.J.B., Class "E," Grade 8, £619 to £629 per annum.

Doncaster District

GENERAL ASSISTANT DISTRICT ENGINEER

Applicants should preferably be graduate members of the Institution of Electrical Engineers and have experience in the construction, operation and maintenance of overhead and underground distribution systems.

Applicants should be prepared to reside in the district and undertake standby duties.

Salary: N.J.B., Class "F," Grade 11, £548 to £565 per annum.

Applications, giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a Denby Dale Road, Wakefield, not later than July 9, 1953.

No. 1 (Bradford) Sub-Area

Keighley District

GENERAL ASSISTANT DISTRICT ENGINEER

Applicants should have passed the graduate membership examination of the Institution of Electrical Engineers or hold other acceptable technical qualifications; they should have experience in construction operation and maintenance of complete high and medium voltage overhead and underground distribution systems.

Candidates must be prepared to reside within the district and undertake standby duties, if required.

Salary: N.J.B., Class "E," Grade 11, £524 to £540 per annum.

Applications, giving full details of age, qualifications and experience, should be forwarded to the Manager, No. 1 (Bradford) Sub-Area, Yorkshire Electricity Board, 45-53 Sunbridge Road, Bradford, not later than July 9, 1953. (E 217)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

FIRST ASSISTANT CONTROL ENGINEER required in System Operation Department, Divisional Headquarters, Birmingham. National Joint Board service conditions, superannuable appointment, commencing salary in accordance with Schedule "C," Grade 5, £649 to £790, ultimately rising to £983.

Higher National Certificate in electrical engineering or equivalent qualification required, together with sound practical training in connection with system operation and control. Generating station experience an advantage.

Application forms obtainable from Establishments Officer, 53 Wake Green Road, Moseley, Birmingham 13, to be returned by July 11, 1953. (E 222)

SOUTH WALES ELECTRICITY BOARD

REQUIRED, DISTRICT COMMERCIAL MANAGER, District 347 (Cardiff East) in the Central Sub-Area.

Applicants must have had experience in the application of electricity in all its branches, negotiation of supplies, public lighting and contracting.

Salary in accordance with Class "G," Grade 3 (£971/£992/£1,014) of N.J.B. Schedule.

Applications, stating age, present position and salary, qualifications and experience, and giving three referees, to be addressed to the Secretary, to arrive by July 4, 1953.

D. G. DODDS,
Secretary.

St. Mellons, Cardiff. (E 224)

BRITISH IRON AND STEEL RESEARCH ASSOCIATION

TECHNICAL ASSISTANT required by the Electrical engineering Section of the Plant Engineering Division of the above Association for applied research in the iron and steel industry.

Applicants should have a National or Higher National Certificate in Electrical Engineering and preferably some experience of heavy electrical engineering. Age range, 22 to 26. Staff pension scheme. Written applications only giving full particulars and stating salary required to Personnel Officer, B.I.S.R.A., 11 Park Lane, London W.1. (E 219)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable posts. Salary, including London Allowance, and conditions of service in accordance with N.J.B. Agreement, Schedule "A." Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. unless otherwise stated.

1. STATION SUPERINTENDENT
Wimbledon Generating Station.

2. STATION SUPERINTENDENT
Hammersmith Generating Station.

Qualifications: Corporate Membership of I.E.E. or I.Mech.E. Candidates must possess good administrative, organising and managerial abilities and have experience of labour relations. A thorough practical and technical training with power station operation and maintenance experience is essential. Salary: (1) Class "E," Grade 1, £1,072 p.a. (2) Class "D," Grade 1, £1,017 9s. p.a.

ASSISTANT ENGINEER (ELECTRICAL)
Barking "A" and "B" Generating Station.

Previous experience of maintenance of electrical plant and equipment preferably at modern power station. Salary, Class "M," Grade 11, £793 16s. p.a.

FIRST ASSISTANT STATION CHEMIST
Brunswick Wharf Generating Station.

Qualifications: University degree or the A.R.I.C. diploma by examination. Experience in the analysis and testing of water, fuels and mineral based oils coupled with an interest in plant operation is desirable. Salary Class "H," Grade 9, £714 p.a.

Application may be made on form obtainable from Divisional Secretary, B.E.A., London Division, Generation House, Great Portland Street, W.1, and be received within 14 days of this advertisement. (E 218)

GOVERNMENT OF QATAR
(Persian Gulf)

Electrification of Doha

POWER STATION ENGINEER

APPLICATIONS are invited for the above appointment. Candidates must have served a mechanical engineering apprenticeship, and have considerable practical experience of the erection, operation and maintenance of diesel engine alternator sets and ancillary equipment, h.v. and l.v. switchgear, and be capable of training local labour. A knowledge of cable and overhead line work would be an advantage.

Salary £140 to £150 per Arabic month, according to qualifications and experience, payable in rupees (Rs—1s. 6d.), and is at present free of tax.

Appointments are for a period of five years, terminable by three months notice on either side.

Free air passage is provided for the officer and his family on first appointment, on termination of agreement and for leave to the United Kingdom.

Free quarters with heavy furnishings, water and light and medical attention will be provided.

Leave is earned at the rate of 90 days per year of resident service and may be accumulated. Earned leave to the United Kingdom may be taken after 18 months service.

A knowledge of Arabic would be an advantage. Applications endorsed "Power Station Engineer—Qatar," stating age, qualifications and experience, should be forwarded within 21 days of the date of this advertisement to the undersigned who will communicate with candidates selected for further consideration.

PREECE, CARDEW AND RIDER.

8-10 Queen Anne's Gate,
Westminster, London S.W.1. (E 193)

CITY OF LIVERPOOL EDUCATION COMMITTEE

COLLEGE OF TECHNOLOGY
Byrom Street, Liverpool, 3

APPLICATIONS are invited for the appointment of ASSISTANT, Grade "B" (full time), Department of Electrical Engineering. Duties to commence September 1, 1953, or as soon after as possible.

Salary: (Men): £490 by £25 to £765, plus appropriate allowances for training and qualifications. Increments allowed for industrial experience.

Applicants should possess Graduate qualifications in electrical engineering, preferably a university degree including heavy current work. Industrial experience and some teaching practice is desirable. The ability to teach mathematics and physics to engineering students would be an advantage.

Application forms and other particulars from H. S. Magnay, M.A., Director of Education, 14 Sir Thomas Street, Liverpool, 1. N.B.—Completed forms should be returned to him within 14 days of the appearance of this advertisement.

THOMAS ALKER,
Town Clerk and Clerk to the Local Education Authority.
(JA 3239) (E 190)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the following positions within the Division:

CIVIL ENGINEERING DRAUGHTSMEN
Construction Department. Vacancy No. 22/53.

Candidates should have experience in design and detail of reinforced concrete structures, piled and slab foundations for heavy plant, culverts, cable subways, etc., for general building construction drainage and sanitation schemes, associated with office and administrative buildings.

The salary will be in accordance with Grade 5 (£567 to £671 per annum) or Grade 6 (£433 to £567 per annum) of Schedule "D" of the National Joint Board Agreement.

Closing date for this appointment will be June 30, 1953.

ENGINEERING DRAUGHTSMEN (MECHANICAL)
Construction Department. Vacancy No. 44/53.

Senior draughtsmen are required in the mechanical section of the Construction Department at North Wilford Power Station. Candidates should have experience in one or more of the following:

(i) Design and layout of power station equipment, including turbo-alternators, boiler plant, coal and ash plant, and general station auxiliaries.

(ii) H.P. and l.p. steam and feed pipework. Condensing plant and feed heating systems.

(iii) Conveyor plant, coal handling systems and material handling of station auxiliary equipment.

Salary and conditions of service will be in accordance with the National Joint Board Agreement, Grade 5, (£567 to £671 per annum) and Grade 6 (£433 to £567 per annum) of Schedule "D," according to experience.

Closing date for this appointment will be June 30, 1953.

JUNIOR ENGINEER
Hinckley Power Station. Vacancy No. 58/53.

Candidates should have gained an Ordinary Certificate in electrical engineering and have had experience in a power station.

The salary will be in accordance with Schedule "A," Class "B," Grade 13 (£380 per annum) progressing to Class "B," Grade 12 (£404 to £423 per annum) of the National Joint Board Agreement.

Closing date for this appointment will be July 6, 1953.

ENGINEERING DRAUGHTSMEN (ELECTRICAL)
Construction Department. Vacancy No. 61/53.

Candidates should have experience in the preparation of layouts and diagrams for the installation of e.h.t. and l.t. switchgear, transformers, e.h.t. and l.t. cables; knowledge of protective gear systems would be an advantage.

The salary will be in accordance with Grade 5 (£567 to £671 per annum) or Grade 6 (£433 to £567 per annum) of Schedule "D" of the National Joint Board Agreement.

Closing date for this appointment will be June 29, 1953.

SHIFT CONTROL ENGINEER
Longford Power Station, Coventry. Vacancy No. 62/53.

Applicants should have had a sound training and practical experience in a modern power station. The possession of technical qualifications is desirable.

Salary will be in accordance with Class "G," Grade 10 (£508 to £630 per annum) of the National Joint Board Agreement.

The closing date for this appointment will be July 1, 1953.

ASSISTANT SHIFT CHARGE ENGINEER
Burton-on-Trent Power Station. Vacancy No. 63/53.

Applicants should have had sound technical training and practical experience in operation and control of power stations and should preferably have the Higher National Certificate in electrical and mechanical engineering.

The salary for this appointment will be in accordance with Class "E," Grade 9 (£587 to £800 per annum) of the National Joint Board Agreement.

The closing date for this appointment will be July 1, 1953.

MAINTENANCE ENGINEER (ELECTRICAL)
Freemen's Meadow Power Station, Leicester.
Vacancy No. 66/53.

Applicants should have a sound knowledge of modern power station equipment including air blast switchgear, large alternators, and p.f. auxiliaries. Corporate Membership of the Institution of Electrical Engineers is desirable.

Conditions of service and salary in accordance with the National Joint Board Schedule "A," Class "H," Grade 6 (£333 to £866 per annum.)

Closing date for this appointment will be July 7, 1953.

DEPUTY POWER STATION SUPERINTENDENT
Derby Power Station. Vacancy No. 67/53

Applicants should preferably be Corporate Members of the Institution of Electrical Engineers and/or the Institution of Mechanical Engineers and experience of pulverised fuel firing will be an advantage.

A wide knowledge of the operation and maintenance

(Continued in next column)

(Continued from previous column)

of a modern generating station and sound administrative ability are essential.

The salary will be in accordance with Class "F," Grade 3 (£912 to £951 per annum) of the National Joint Board Schedule.

Closing date for this appointment will be July 7, 1953.

GENERAL ASSISTANT ENGINEER
Technical Department, Divisional Headquarters.
Vacancy No. 49/53.

The minimum technical qualification required is the Higher National Certificate in electrical engineering. Preference will be given to candidates who have completed a recognised post graduate apprenticeship and experience of high voltage switchgear and protective gear will be an advantage.

The successful candidate will be required to reside at or near Nottingham or Leicester.

The salary will be in accordance with Schedule "C," Class "AX/DX," Grade 8 (£501 to £994 per annum) of the National Joint Board Agreement. The commencing salary will depend on qualifications and experience.

Closing date for this appointment will be July 6, 1953.

The above appointments will be pensionable within the provisions of the British Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, and should be returned to the undersigned by the dates stated. Please quote vacancy number.

L. F. JEFFREY,
Divisional Controller.
(E 221)

BRITISH ELECTRICITY AUTHORITY

South Eastern Division

ASSISTANT ENGINEER (HANDLING)—Croydon "B" Power Station. Applicants who should possess a knowledge of coal storage and its associated problems, will be responsible for the operation of the coal and ash handling plant and associated equipment including mobile equipment. Experience in the control of labour is essential. N.J.B. conditions of service and salary Class "J," Grade 12, £625 16s. per annum, including London Allowance. Applications, giving details of education, present position, experience etc., should be received by the Station Superintendent, Croydon "B" Power Station, Beddington Farm Lane, Purley Way, Croydon, Surrey, not later than July 4. (E 216)

SOUTH WALES ELECTRICITY BOARD

REQUIRED, SENIOR ASSISTANT (Industrial Supply) in Commercial Department of the Board at its Head Office, St. Mellons.

Duties involved include the negotiation of important supplies to industry, the general development of the industrial load and advice to industrial consumers upon the utilization of electricity.

Salary in accordance with Class "AX/CX," Grade 1 (£970/£1,166) of N.J.B. Schedule.

Applications, stating age, present position and salary, qualifications and experience, and giving three referees, to be addressed to the Secretary, to arrive by July 4, 1953.

D. G. DODDS,
Secretary.
St. Mellons, Cardiff. (E 225)

BRITISH ELECTRICITY AUTHORITY

North Western Division

VACANCY No. 137-53. DEPUTY POWER STATION SUPERINTENDENT at new Chadderton H.P. Generating Station, nr. Oldham. Salary £971 to £1,014 (G.3). Good technical qualifications and wide experience of operation, maintenance and administration of modern power plant essential.

Vacancy No. 138-53. MAINTENANCE ENGINEER (MECHANICAL) at new Chadderton H.P. Generating Station. Salary £787 to £818 (G.6).

Apply to Establishments Officer, British Electricity House, 825 Wilmslow Road, Manchester 20, quoting Vacancy No. before July 11. (E 206)

BRITISH ELECTRICITY AUTHORITY

South Eastern Division

JUNIOR ENGINEER (Control). Croydon "B" Power Station. Applicants should preferably possess educational qualifications equivalent to Higher National Certificate and should have had experience in the operation of E.H.T. switchgear and parallel running of alternators. Class "J," Grades 18/14. Commencing at £427 per annum, including London allowance. N.J.B. conditions of service.

Applications, giving details of present position, education, experience, etc., should be received by Station Superintendent, Croydon "B" Power Station, Beddington Farm Lane, Purley Way, Croydon, Surrey, not later than July 4. (E 205)

MERSEYSIDE AND NORTH WALES ELECTRICITY BOARD

FIRST ASSISTANT DISTRICT COMMERCIAL OFFICER required in the No. 2 Sub-Area (Runcorn District). Salary £791 to £818 per annum (N.J.B. Class "F," Grade 5).

Applicants should have had considerable experience on the commercial side of the electricity supply industry, including the supervision of contracting work. Membership of the Institution of Electrical Engineers advantageous.

The appointment is superannuable and subject to medical examination.

Standard application forms obtainable from the Manager, No. 2 Sub-Area, Electricity House, Sandiway, near Northwich, Cheshire. Closing date, July 6, 1953. (E 220)

ASSISTANT MECHANICAL MAINTENANCE ENGINEER required for organisation in East London district operating large electrical station. Applicants should have wide and up-to-date experience in the maintenance of modern generating station power plant and be capable of supervising turbine and boiler overhauls. Technical qualifications should be sound. Age not less than 32 or over 45. Commencing salary £950 per annum, with non-contributory pension. Position has excellent prospects.—Reply to Box No. 2727, Electrical Times, quoting Ref. TME/6. (E 194)

ASSISTANT STATION SUPERINTENDENT wanted by Public Utility (affiliate of American and Foreign Power Co. Inc., New York) for 30,000 kW steam station now under construction at Cariobs, Sao Paulo, Brazil (which place has a healthy, mild, climate). Applicants should have had at least five years experience in the operation of plant of 400 psi or above, be familiar with the "Hagan" control system, feed water treatment and switchboard operation, and possess technical qualifications to corporate membership standard of the Institutions of Electrical or Mechanical Engineers. Applicants should be aged 28-35, preferably married. New house supplied, liberal salary, first-class passages for family out and home and home leave, with full pay every three years.—Reply, stating briefly qualifications, experience and age. Application form will be forwarded. Box No. 2737, Electrical Times. (E 212)

BRITISH ELECTRICITY AUTHORITY require SENIOR COMMERCIAL ASSISTANT at Headquarters in London. Applicants should have extensive experience in the distribution and commercial activities and the general economics of the electricity supply industry. Preference will be given to chartered electrical engineers or those with engineering degree. Salary according to qualifications and experience within Provisional Scale £1,175 by £50 to £1,475. Pension scheme.—Applications to D. Moffat, Director of Establishments, Winsley Street, London W.1, by July 13, 1953. Quote reference AE.390. (E 237)

DEVELOPMENT DESIGN DRAUGHTSMEN required for a small group engaged upon general engineering developments including special purpose automatic and semi-automatic machinery, metallurgical and chemical engineering processes and plant, combustion and electric furnaces, electrical power control and measuring equipment. Applicants must be engineers with professional or academic qualifications and workshop apprenticeship, and preferably over 28 years of age. These vacancies are only for men with high ability and several years experience of original design, and capable of supporting a programme of rapid capital expansion and long-term development. Candidates should be able to produce recent references and sample designs if necessary.—Apply: Personnel Manager, Garringtons, Ltd., Bromsgrove, Worcs. (E 207)

DRAUGHTSMEN. The English Electric Co., Ltd., at Liverpool, have vacancies for ELECTRICAL DRAUGHTSMEN with good experience of switchgear wiring diagram work. Pensionable and progressive positions with excellent opportunities for promotion are offered to men with initiative.—Write, quoting ref. 140D, to Central Personnel Services, English Electric Co., Ltd. 336-7 Strand, London W.C.2. (E 108)

ELECTRICAL CONTRACTORS require BRANCH MANAGER. Exceptional opportunity to qualified man with thorough knowledge of the industry; one used to dealing with architects and engineers. Vacancy, Southern Ireland. Fullest confidence to applicant.—Write Box No. 2739, Electrical Times. (E 226)

ELECTRICIAN required for Middle East. Experienced in use of conduit, Pyrotenax, earthing, etc.—State age, experience, with copies of reference or names to whom we may apply, to Box No. 2741, Electrical Times. (E 227)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

ELECTRICAL DRAUGHTSMAN required for large Sheffield steelworks. Experience is desirable, but not essential, in the preparation of wiring diagrams, shop layouts for lighting, heating and service trenchwork and to be capable of taking measurements on site and preparing cable plans and schedules, together with general service records.—Apply, stating age and details to the Labour Superintendent, Samuel Fox and Co., Ltd., Stocksbridge Works, nr. Sheffield. (E 208)

ELECTRICAL ENGINEERING DRAUGHTSMAN required by Tees-side firm of engineers for the power and lighting installations of their various contracts. The work will include the preparation of control schemes, and wiring diagrams, and contract requisitioning of equipment.—Apply, stating age, experience and qualifications to Box No. 2729, Electrical Times. (E 195)

ELECTRICAL TECHNICAL REPRESENTATIVES required, one located Manchester-Leeds area, one located Glasgow-Newcastle area. To sell electromagnetic equipment, coils, transformers, etc., to industry. Minimum qualification G.I.E.E. Car driver, preferably owner. Previous sales experience not essential. Salary £500 to £600 with expenses and commission. Permanent and interesting employment.—Write Box No. 2751, Electrical Times. (E 239)

ELECTRICIANS required by the Steel Company of Wales, Ltd., Steel Division, Port Talbot. Applicants should have experience on the maintenance of heavy industrial plant, including high-voltage switchgear.—Applications, in own handwriting, giving age, experience, etc., to be addressed to the Personnel Superintendent, The Steel Company of Wales Ltd., P.O. Box No. 3, Port Talbot. (E 168)

ESTIMATING ENGINEER required for battery traction sales. Electrical degree or Higher National Certificate essential. Previous experience in similar job an advantage, but not essential. Age not over 30. Permanent post carrying pension for suitable applicant.—Apply by letter in first instance, outlining experience and salary desired, to Commercial Manager, Nife Batteries, Redditch, Worcs. (E 209)

HOUSECRAFT ADVISER AND COOKERY DEMONSTRATOR with first-class experience and training is required at the Manchester branch of the G.E.C. Preference will be given to applicants with E.A.W. Certificate and experience of demonstrating electrical equipment. —Applications in writing should give full details of age and record, and be sent to the Staff Manager, The General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2, quoting Ref. MB.2. (E 196)

JUNIOR ASSISTANT ELECTRICAL ENGINEER required for service with the Sudan Light and Power Co. Ltd. in Khartoum (Anglo-Egyptian Sudan). Salary range, £E.900/£E.1,380 (£E.1 equals £1/-/6). Applicants should have had a sound general education, have served an apprenticeship or undergone practical training suitable to the industry, and be graduates of the Institution of Electrical Engineers. They should also have experience in the distribution side of electricity supply undertaking and be able to carry out, under the supervision of the electrical engineer, works in connection with the construction, maintenance and operation of H.V. and L.V. overhead and underground mains and substations. Knowledge of electrical generating plant and associated switch and control gear would be of advantage.

Appointment will be on contract for 5 years, including a period of 12 months' probation, with a bonus payable on completion of the contractual period. A cost-of-living allowance will be payable in addition to salary. A kit allowance of £E.50 will be payable on appointment. Free living accommodation with basic furniture or an allowance in lieu thereof and free transport will be provided. After satisfactory completion of the probationary period liberal leave on full salary with free passages. There is at present no income tax in the Sudan.

Applications, stating age, education, qualifications, experience (with particulars of posts held), present appointment and salary, with names of two references should be submitted to the Secretary, The Power and Traction Finance Co. Ltd., Queens House, Kingsway London W.C.2. (E 210)

JUNIOR ENGINEER required for sales office of temperature control engineers.—Write, giving age, training and experience, to DHS, c/o The Rheostatic Co. Ltd., Slough, Bucks. (E 170)

LONDON TRANSPORT require ELECTRICAL ASSISTANT in Substations Engineer's Section to deal with technical matters concerning electrical supply substations. Applicants should have sound technical training, Higher National Certificate (Electrical Engineering), or equivalent qualifications, and ability to prepare clear and concise reports advantageous. Salary range £599 to £679 with prospects of advancement to £739. Medical examination; contributory superannuation scheme after probation.—Applications within 14 days to Staff Officer, (S/EV240), London Transport, 55 Broadway, S.W.1. For acknowledgement enclose addressed envelope. (E 243)

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

LABORATORY ASSISTANTS for the development of instruments, meters and relays. University degree or Higher National Certificate standard required.—Apply in writing, stating age, experience and salary required, etc., marking envelopes "Meter Engineer," to Personnel Manager, Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester 17. (E 20)

MIDDLE EAST Oil Company requires ASSISTANT POWER STATION SUPERINTENDENT, aged under 40 and capable of operating oil- or gas-fired steam power station. Chartered qualification and 10 years' steam power station experience. Pensionable post carrying paid home leave rights. Emoluments, for a bachelor, over £1,800 p.a. For a married man this figure would be increased.—Write, quoting No. 351, to Box No. 6854, c/o Charles Barker and Sons, Ltd., 31 Budge Row, London, E.C.4. (E 228)

PLUMBER JOINTER for Middle East, experienced in jointing paper cables, lead covered and armoured up to 11 kV.—Apply, stating age and experience, forward copies of testimonials, or state names to whom we may apply, to Box No. 2705, Electrical Times. (E 146)

SALES ENGINEER required to promote sales of standard and special types of lighting, communications and electronic cables to Government depts., research establishments, nationalised industries, etc. Existing connections essential. Remuneration by salary and commission.—Write fullest details Box No. 2707, Electrical Times. (E 147)

SALESMEN for electric lamps of all kinds, ex-W.D., new, mostly ring makes—at very low prices—wanted. Liberal commission.—Box No. 2743, Electrical Times. (E 229)

SENIOR DRAUGHTSMAN required having experience in design and manufacture of cable-making machinery.—Applications in writing, stating age, technical qualifications, experience and salary required, to Employment and Welfare Manager, Johnson and Phillips, Ltd., Charlton, S.E.7. (E 184)

SENIOR SUPERVISING ENGINEER required for electrical contractors engaged on large contracts for power stations, aerodromes, factories, schools, etc., to be mainly responsible for estimating department and supervising through all stages of certain contracts. Must be thoroughly experienced in pricing electrical bills of quantities, preparation and pricing of tenders, supervising of large contracts and preparation of final accounts. Permanent position, bonus scheme, car allowance, etc. —Watson-Norie Ltd., 21 Lovaine Place, Newcastle-on-Tyne 1. (E 197)

TECHNICIAN (TELEPRINTER MAINTENANCE) required for NORTHERN RHODESIA GOVERNMENT Posts and Telegraphs Department for tours of three years in first instance with prospect of permanency. Salary, etc., in scale £651, rising to £1,103 a year. Free passages. Liberal leave on full salary. Candidates should possess C. and Gds. Certs. in Telecoms. and have had five years' training in Post Office workshops or a similar apprenticeship. Experience should include maintenance of Creed teleprinters, V.F. telegraph system and preferably 3- and 12-channel carrier equipment, the Strowger type of automatic equipment and telecoms. practice. G.P.O. staff should apply through their department.
Write to the Crown Agents, 4 Millbank, London S.W.1. State age, name in block letters, full qualifications and experience, and quote M2C/29951/EE. (E 230)

THE GENERAL ELECTRIC CO. LTD. has a vacancy at the Head Office of their Sales Organisation for a PUBLICITY LIAISON OFFICER. Applicants should be in the age group 25-30 years and possess an Ordinary National Certificate. Previous experience in the preparation of catalogues and technical articles is essential, and some knowledge of industrial heating equipment an asset.—Apply in writing to the Staff Manager, Magnet House, Kingsway, London W.C.2. (E 199)

THE GENERAL ELECTRIC CO., LTD., invite applications from suitably qualified men in the age group 25-30 years who are interested in space heating and water heating business. Applicants should possess an Ordinary National Certificate—preferably H.N.C.—and have had some previous experience in this type of work. The positions which exist in the Head Office of the Company's Sales Organisation, carry a good commencing salary and prospects.—Apply, in writing, quoting reference "I.H.", to the Staff Manager, Magnet House, Kingsway, W.C.2. (E 231)

TECHNICAL SALES CORRESPONDENT required for progressive manufacturers of scientific instruments and small electrical assemblies. Higher National Certificate. Knowledge electro-magnetic devices an advantage. Housing and pension scheme available. Excellent prospects.—Write full details, age, qualification, experience and present salary, Box No. 2731, Electrical Times. (E 198)

TRANSFORMER DESIGN ENGINEERS required. Applicants should have served a recognised apprenticeship and be qualified to H.N.C. standard. Drawing office and test experience would also be an advantage but are not essential. The conditions of employment are excellent, including a first-class non-contributory pension scheme, and the positions offer plenty of scope and opportunities of advancement to men with the required ability and initiative.—Please apply, with full details of training, experience, age, salary, etc., to The Personnel Dept., The Brush Electrical Engineering Co., Ltd., Loughborough, Leics. (E 148)

TRANSFORMER DESIGNER required in Lancashire for work on power transformers up to 10,000 kVA, 3 ph. 66,000 V. Applicants should have university degree and be Associate Members of the Institution of Electrical Engineers. The position holds good prospects for a keen, energetic man.—Please state age, experience and salary required, to Box No. 2709, Electrical Times. (E 149)

VACANCY occurs in Lincolnshire for ELECTRICAL DRAUGHTSMAN preferably with experience in the layout of control gear and diagrams. First-class working conditions. Canteen and recreational facilities. —Applications stating qualifications and experience to Box No. 2721, Electrical Times. (E 185)

WORKS SUPERINTENDENT to take charge of production in small works in N. Midlands producing electrical control gear. Will be required to control the drawing office and manufacture but will not be responsible for design. The position is permanent and pensionable and carries an attractive salary. House will be made available.—Reply, Box No. 2711, Electrical Times. (E 150)

APPOINTMENTS WANTED

ELECTRICAL AND MECHANICAL ENGINEER, age 43, graduate Vienna University, full practical and business experience Europe, India and Burma. Expert knowledge electric welding, air conditioning and refrigeration. Capable taking charge production, design and sales promotion. Seeks suitable position in United Kingdom, no preference London or Provinces.—Write Box No. 2733, Electrical Times. (E 200)

ENGINEER, Grad.I.E.E., A.M.I.Plant.E. (31), experienced all types installations, h.t. and l.t., plant maintenance, 3½ years consulting engineers on generating station construction, seeks progressive position U.K. or overseas.—Box No. 2723, Electrical Times. (E 187)

PROTECTION and Control ENGINEER, extensive experience in application, engineering and commissioning of protective and control equipment for major generation and transmission installations home and overseas, seeks responsible position. North East coast.—Box No. 2713, Electrical Times. (E 151)

WINDING SHOP FOREMAN, thoroughly experienced winding/assembling/testing all types and sizes of machines a.c.-d.c., repair shop or production, desires change.—Box No. 2735, Electrical Times. (E 201)

WORK WANTED

A.C. and d.c. MOTOR REWINDS and REPAIRS. Prompt service fully guaranteed. Edgware 5566 (4 lines). —Service Electric Co., Ltd., Stanmore, Middx. (E 13)

ARMATURE REWINDING service to the trades Vacuums, Drills, Grinders, Hood Dryers, Dental, Motors. Vacuum cleaner and drill armatures replaced from stock. 24-hour service. Every job guaranteed. All vacuum cleaner parts, hoses, etc., in stock for any make. Apex washer agitator shafts stocked.—Regam Electric Cleaner Service, 95 Park Lane, Leeds 1. (E 25)

BURNT OUT fluorescent tubes RECONDITIONED.—E. J. Dawes, Ltd., Erimus Works, Stockton Street, Middlesbrough. (E 34)

FISHER FOUNDRIES, LTD., Greet, Birmingham, have immediate capacity for machine moulded PRECISION CASTINGS in gunmetal and grey iron, ¼ to 30 lb. All castings shot blasted.—Telephone: Birmingham, Victoria 0197. (E 17)

METALWORK. All types cabinets, chassis, racks, etc., to your own specification.—Philpott's Metalworks Ltd., Chapman Street, Loughborough. (E 42)

WORK WANTED. Capacity available for all types of COIL WINDING.—Box No. 2425, Electrical Times. (E 18)

WANTED

A.C.-D.C. MOTORS, STARTERS, complete change-over installations, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Tel.: Chiswick 5105. (E 8)

REDUNDANT stocks of bare, insulated and enamelled COPPER WIRE.—Offers to Box No. 2649, Electrical Times. (E 26)

WANTED, D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co., Ltd., 22-26 Britannia Walk, London N.1. (E 4)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of secondhand machinery and plant for re-use.—W. and H. Cooper, Ltd., 176 Brady Street, Bethnal Green, E.1. (E 1)

WANTED, Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock water-tube boilers. Best prices paid. Prepared to purchase Babcock and Wilcox water-tube boilers for dismantling.—Apply, giving full details, to Midland Iron and Hardware Co., Cradley Heath, Staffs. (E 2)

WANTED, ROTARY CONVERTERS, any size.—Universal, 221 City Road, London E.C.1. (E 6)

AGENCIES

AGENT. Irishman of 24, at present on holiday near London, has eight years' experience in the radio electrical trade and proved selling ability, wishes to act as representative in Eire for English firm in electrical trade. Good connections, own 1950 car, fidelity bond available, first-class refs.—Box No. 2745, Electrical Times. (E 232)

FOR SALE

CABLES & WIRE

ELECTRIC CABLE, twin cab tyre, 14/012, price 40/- per 100 yd. drum.—H. H. Bradford, Ltd., Ramsey, Harwich, Essex. (E 240)

DOMESTIC APPLIANCES

GRUBB IMMERSION HEATERS. No purchase tax on the 7 kW models. Provision for usual domestic loadings as required. All sizes, 16 in. to 30 in. Immediate delivery.—For particulars and trade terms write distributors, John Owner and Co. Ltd., Springfield Road, Birmingham 13. Tel.: Springfield 2939. (E 22)

ENGINEERING PLANT & MATERIALS

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

THE British Electricity Authority invites tenders for the SALE of scrap plant at the Lincoln Power Station. The successful tenderer shall dismantle and remove the plant. The plant includes the removal of two TURBO-ALTERNATORS, and four stoker-fired WATER TUBE BOILERS.

The specification for the plant and conditions of sale No. 6/Lincoln/57/M.25 may be obtained from the Divisional Controller, British Electricity Authority, East Midlands Division, Barker Gate, Nottingham, quoting ref.: GC/FF/GGT. Application in writing should be accompanied with a deposit of £2, which will be returned upon receipt of a bona-fide tender. Tenders are to be delivered to the British Electricity Authority not later than 12 noon, on Monday, August 31, 1953. (E 233)

GENERATING PLANT

FOR SALE. One self-contained diesel electric GENERATING SET, 55 kW capacity, by Associated British Oil Engines, Ltd. McLaren "MR4" diesel 88 b.h.p. at 1,000 r.p.m. Switchgear and alternator by Brush Electrical.—Mollart Engineering Co., Ltd., Kingston By-pass, Surbiton, Surrey. (E 202)

LIGHTING EQUIPMENT

PURLEY CHOKES AND BALLASTS. Our 80 W tapped h.p.f. ballast, with starter switchgear-holder incorporated, is proving itself the most popular unit. Suitable for most fittings, 57s. 6d. each subject.—F. W. Blanshard, Ltd. (Dept. E.T.), Purley, Surrey. Uplands 4818-9. (E 14)

MOTORS & STARTERS

All types and sizes of

Industrial Electrical Equipment

ELECTROPOWER COMPANY LIMITED
Kingsbury Works, Kingsbury Road, London, N.W.9
Telephone: COLindale 4621/2. (E 12p)

A.A. ELECTRICAL CO. for A.C.-D.C. MOTORS, SWITCHGEAR, EXHAUST FANS, HOISTS, REDUCTION GEARS, new or reconditioned units.—Chiswick 5105, Chiswick 5605, 67 Rothschild Road, W.4. (E 7)

A.C. and D.C. MOTORS, all sizes, large stocks. Fully guaranteed.—Milo Engineering Works, Ltd., Milo Road, East Dulwich, S.E.22. (Forest Hill 2278-9.) (E 3)

A.C. and D.C. MOTORS, GENERATORS from stock.—Service Electric Co., Ltd., Honeypot Lane, Stanmore, Middx. Edgware 5566-9. (E 9)

FOR SALE. As new, 90 b.h.p. B.T.H. "no lag" SLIP RING MOTOR, 400—440 V, 3 ph., 50 c/s., speed 990 r.p.m., ball and roller bearing, complete with Ellison Rotor Starter, also Ellison Circuit Breaker. Immediate delivery from stock.—Apply: G. E. Simm (Machinery), Ltd., East Parade, Sheffield. (E 241)

MARTIN'S armature and field winder in one unit is the perfect answer to winding your own small motors.—Arrow Works, 147 Camden Road, Tunbridge Wells. (E 32)

METERS

A.C.-D.C. QUARTERLY and SLOT METERS.—Brent Electrical Co., 6 Holmdale Gardens, London N.W.4. (E 5)

HOUSE-SERVICE METERS, a.c. or d.c., quarterly or prepayment.—Universal Electrical, 221 City Road, London E.C.1. (E 10)

PREMISES

LONDON, S.E.1. Substantial factory/warehouse premises in prominent position. Open floor space 12,500 sq. ft. Good lighting, lift, usual services. Freehold for sale. No agents.—Apply Box No. 2747, Electrical Times. (E 234)

SWITCHGEAR

MERCURY SWITCHES are made by Hall, Drysdale and Co. Ltd., of 58 Commerce Road, Wood Green, London N.22. Tel.: BOW 7221. (E 11)

TIME SWITCHES for sale. Reconditioned or new. 12 months' guarantee. Immediate delivery.—Lists from J. W. Hughes, 3 St. Thomas's Street, London Bridge, S.E.1. (Tel.: HOP. 2759.) (E 23)

TRANSFORMERS & CONVERTERS

CURRENT-TRANSFORMERS, ring type, 100-300 amps. Delivery ex stock.—Hurst Electrical Industries Ltd., 75a Well Street, London E.9. Amherst 4166. (E 21)

UNCLASSIFIED

A HIGH VACUUM IMPREGNATION UNIT, to R.I.C. Specification 214 or individual requirements. Good delivery at competitive prices from Blickvac, 505 Lordship Lane, S.E.22. Forest Hill 7089. (E 19)

FOR SALE, equipment from East Retford Generating Station—one National GAS ENGINE, 300 h.p. water cooled, 300 r.p.m., 3 cylinder vertical, year 1926, complete with access platforms and iron ladder. A quantity of pipe and certain engine spares are also available for disposal.

One Electric Construction Co. ALTERNATOR 200 kW, 6,600 volts, 3 phase 0·8 p.f. 300 r.p.m., 50 cycles, continuous rating. Year 1926, complete with exciter.

One National GAS ENGINE, 400 h.p. water cooled, 300 r.p.m. 4 cylinder vertical. Year 1926.

One Electric Construction Co. ALTERNATOR 270 kW, 6,600 volts, 3 phase 0·8 p.f. 300 r.p.m. 50 cycles, continuous rating. Year 1926, complete with exciter.

For further particulars apply to—Divisional Purchasing Officer, East Midlands Division, Barker Gate, Nottingham. (E 235)

FOR SALE, automatic TELEPHONE SWITCHBOARD, 100-line capacity, complete with emergency batteries. Manufactured 1948, in excellent condition. About 20 instruments also available.—Apply: The Cementation Co., Ltd., Ellerbeck Site, Slaidburn, nr. Clitheroe, Lancs. Tel.: Slaidburn 228. (E 203)

FOUR new English Electric outdoor magnetic shielded REACTORS in tubular tank, with 190 gallons of oil (flashpoint 366° F.). H.t. and l.t. trifurcating boxes, conduit and junction box, buchholz device, earth eye, drain valve, expansion vessel with oil gauge, breather cap and output plate to give 121 kVA, 3 ph., 50 c/s., primary volts 3,300 amps. 350 (mounted on axles and wheels). Cost £570 each. Substantial discounts can be accepted for quick sale.

180 sets CHOKING CORES for "Howrah" 32 fan regulators. 70 sets ditto 36 fan regulators. Cost £156. Can accept £70. H. E. Butler (Southsea), Ltd., 78 Marmion Rd., Portsmouth (71435-6). (E 242)

MODERN INSTALLATION OF BOILER PLANT, 30 ft. by 8 ft. dia. by Daniel Adamson, "Unidish" type, 150/160 lb. W.P.

30 ft. by 8 ft. dia. by Daniel Adamson, flat ended type, 180 lb. W.P.

Three 30 ft. by 8 ft. 6 in. dia. by Daniel Adamson. Two for 120 lb. W.P. and one for 150 lb. W.P.

Each boiler at present fitted mechanical stoker and Redler coal conveyor system.

Also available two Greens gilled tube economisers, electrically driven boiler feed pump by Harland and steam driven boiler feed pump. Prompt delivery.

George Cohen Sons and Co. Ltd., Wood Lane, London, W.12. Tel. Shepherds Bush 2070 and Stanningley, nr. Leeds. Tel.: Pudsey 2241. (E 192)

2,000 new RELAYS G.P.O. 600, 1,000 ohms, cheap. Box No. 2749, Electrical Times. (E 236)

MISCELLANEOUS

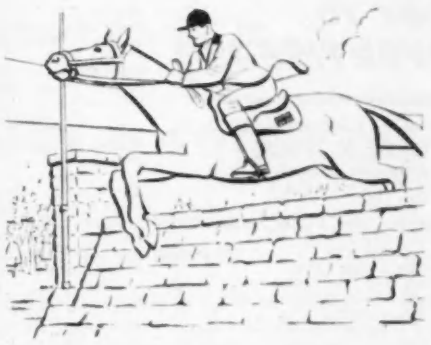
CITY AND GUILDS (Electrical, etc.) on "No Pass—No Fee" terms. Over 95 per cent. successes.—For full details of modern courses in all branches of Electrical Technology send for our 144-page handbook. FREE and post free.—B.I.E.T. (Dept. 39), 17 Stratford Place, London W.1. (E 15)

FREE! Brochure giving details of courses in ELECTRICAL ENGINEERING and ELECTRONICS, covering A.M.Brit.I.R.E., City and Guilds, etc. Train with the Postal Training College, operated by an Industrial Organisation. Moderate fees.—E.M.I. Institutes, Postal Division, Dept. ET.29, 43 Grove Park Road, London W.4 (Associate of H.M.V.). (E 16)

IT IS DESIRED to secure the full commercial development in the United Kingdom of British Patents Nos. 623,637 and 624,669, which relate to "VARIABLE RESISTORS PARTICULARLY FOR MEASURING DEVICES," "INDICATING INSTRUMENTS," either by way of the grant of licences or otherwise on terms acceptable to the Patentee. Interested parties desiring copies of the patent specifications should apply to Stevens, Langner, Parry and Rollinson, 5 to 9 Quality Court, Chancery Lane, London W.C.2. (E 211)

ELECTRICAL REMOTE CONTROL
CO., LTD. **HARLOW 3032**
A.C. & D.C. Multi-Contact and Mercury
RELAYS : Automatic Process TIMERS
INDUSTRIAL ESTATE, HARLOW NEW TOWN, ESSEX

INSTRUCTION CHART
For dealing with apparent death from
ELECTRIC SHOCK
Mounted on strong board, varnished and corded for hanging
Price 3/- plus 11d. postage (per single copy)
ELECTRICAL TIMES
Sardinia House, Sardinia St., LONDON, W.C.2



Sustained Performance

P&B

THERMAL INSTRUMENTS

For many years, P. & B. Thermal Instruments have been specified for use in power stations, government departments, iron, steel and chemical works, oil plants, cement works and paper mills, both in this country and overseas.

Complete and positive protection for polyphase motors, against phase failure, overload, short-circuit and earth fault is afforded by the correct type of **P. & B. Golds Thermal Overload Relay.**

In addition to Thermal Overload Relays, P. & B. Maximum Demand Indicators are available in twelve different patterns from single-phase to three-phase models for maximum demand tariff, to load indication in unattended substations.

THE P & B ENGINEERING CO·LTD

Crompton Way . Crawley . Sussex.

Telephone: Crawley 1004

FOXHUNTER

"The Olympic Games of 1952 at Helsinki will remain in the minds of those privileged to see them—in the British minds, that is—as Foxhunter's Games." This comment by author Pat Landsberg in "Foxhunter" (Todd) stresses a highlight in the wonderful career of possibly the century's most famous British horse. Many other conquests before and since that day have helped to make Foxhunter known to many more people than are usually interested in horsemanship.

INDEX TO ADVERTISERS

Arrow Electric Switches, Ltd. ... 80
Association of Steel Conduit Manufacturers 69
Auchterlonie, Chas., & Co., Ltd. 78
Automatic Telephone & Electric Co., Ltd. 29

Barbour, Wm., & Sons, Ltd. ... 64
Belling & Co., Ltd. 6
Belmos Co., Ltd. 47
Bill Switchgear, Ltd. 5
Birch, H. A., & Co., Ltd.... ... 25
Booth, James, & Co., Ltd. ... 33
Bridgens, Arthur, Ltd. 74
British Power Transformer Co., Ltd. 16
British Instrument Industries Exhibition 36
British Insulated Callender's Cables, Ltd. 1
British National Electrics, Ltd. 2
British Thomson-Houston Co., Ltd. 82
Brush Electrical Engineering Co., Ltd. 49, 73

Carter, B. & F. & Co., Ltd. ... 78
Chamberlain & Hookham, Ltd. 65
Chance Bros., Ltd. 20
Chloride Batteries, Ltd. ... 23
Clifford, Charles, & Son, Ltd. ... 14
Clyde Blowers, Ltd. 16
Connolly's (Blackley), Ltd. ... 24
Cressall Manufacturing Co., Ltd. 4
Crockatt, W. & Sons, Ltd. ... 10

Deco Engineering Co., Ltd. ... 10
Dorman & Smith, Ltd. 84
Drake & Gorham Wholesale, Ltd. 78

Electric Construction Co., Ltd. 67
Electrical Devices Co., Ltd. ... 74
Electrical Remote Control Co. Ltd. 61
Elliott Bros. (London), Ltd. ... 26
Enfield Cables, Ltd. 22
Engineering & Lighting Equipment Co., Ltd. 71
English Electric Co., Ltd. 37, 79
Everett Edgecumbe, Ltd. ... 81

Ferranti, Ltd. 15
Fry's Metal Foundries, Ltd. ... 50

Geipel, Wm., Ltd. 80
General Electric Co., Ltd. 17, 42
Genristo, Ltd. 28
Gent & Co., Ltd.... 30
Gilflex Conduits, Ltd. 84
Gillott Electro Steam Cookers, Ltd. 12
Glover, W. T., & Co., Ltd. ... 83
Green, E., & Son, Ltd. 19

Hackbridge & Hewittic Electric Co., Ltd. 32
Heayberd, F. C., & Co., Ltd. ... 28
Henley's W.T. Telegraph Works Co., Ltd. 53
Hoover, Ltd. 52
Horstmann Gear Co., Ltd. ... 14
Howard Clayton-Wright, Ltd. ... 78

Igranic Electric Co., Ltd. ... 40
Imperial Chemical Industries, Ltd. 31
International Combustion, Ltd. 35
Johnson & Phillips, Ltd.... ... 13

Key Engineering Co., Ltd. ... 80

Laurence, Scott & Electromotors, Ltd. 3
Legg (Industries), Ltd. 72
Lewis Spring Co., Ltd. 80
Lindley Thompson Transformer and Service Co., Ltd. 39
L.P.S. Electrical Co., Ltd., The ... 74

McKechnie Brothers, Ltd. ... 41
Marryat & Place, Ltd. 12
Martindale Electric Co., Ltd. ... 62
Metropolitan-Vickers Electrical Co., Ltd. 45, 54
Metway Electrical Industries, Ltd. 70
Midland Electric Manufacturing Co., Ltd. 63
M.K. Electric, Ltd. 8

Nettle Accessories, Ltd. ... 75
Nu-Swift, Ltd. 76

Partridge Jones & John Paton, Ltd. 21
P. & B. Engineering Co., Ltd. ... 61
Pike, George, Ltd. 4
Philips Electrical, Ltd. 7
Pinchin, Johnson & Co. 72
Plessey Co., Ltd., The 38
Power Centre Co., Ltd. 9
Premier Cooler & Engineering Co., Ltd., The 68
Pye, W. G., & Co., Ltd. 68

Revo Electric Co., Ltd. 27
Rotunda, Ltd. 4

Sanders, William, & Co. (Wednesbury), Ltd. 18
Scemco, Ltd. 76
Scottish Cables, Ltd. 77
Siemens Electric Lamps & Supplies, Ltd. 46
Spencer Wire Co., Ltd. 64
Sperryn & Co., Ltd. 76
Standard Telephones & Cables, Ltd. 34
Statter, J. G., & Co., Ltd. ... 76
Sterling Cable Co., Ltd. ... 48

Transformer & Electrical Co., Ltd., The 74

United Ebonite & Lorival, Ltd.... 11
U.S. Metallic Packing Co., Ltd.... 70

Volex Electrical Products, Ltd.... 43

Ward, Thomas W., Ltd. ... 10
Whitecross Co., Ltd. 70
Wootton & Co., Ltd. 20

Yarrow & Co., Ltd. 44

Zenith Electric Co., Ltd., The ... 36

is it alive ?
what voltage (up to 600) ?
A.C. or D.C. ?
which is "earth" ?

THE MODEL
MARTINDALE 53
VOLTAGE TESTER

OVER 250,000 IN USE

Light yet sturdily built for constant duty and long life. Easily carried in the pocket. NO glass to break. NO gas to leak.
FULLY PROTECTED AND FUSED

tells you instantly

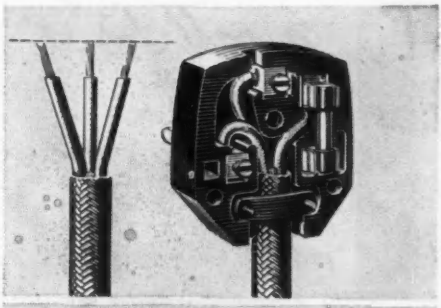
and with ***absolute safety*** even on heavily fused conductors

MARTINDALE ELECTRIC CO., LTD. 45 WESTMORLAND ROAD, LONDON, N.W.9
also at 25 Elmbank Street, Glasgow, C.2

How's this for good design in

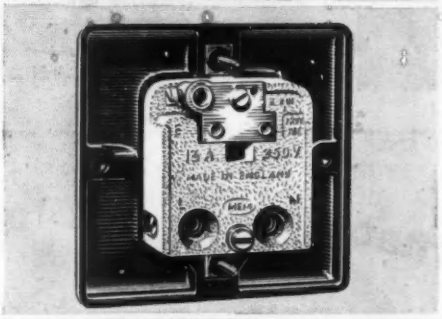
MEM PLUGS & SOCKETS?

To BS. 1363



CUT ALL THREE LEADS THE SAME LENGTH

MEM plugs are designed so that all cable leads can be cut to the same length. Every installation engineer will appreciate this point.



BASE OF SOCKET IS OF PORCELAIN AND THEREFORE DEFINITELY NON-TRACKING

MEM make their own high quality electrical porcelains.

EXTRA SAFE SHUTTER MECHANISM

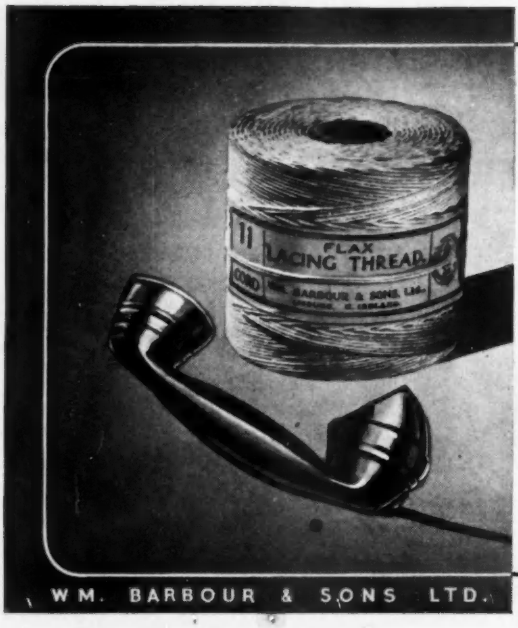
Access to live terminals is impossible until the shutter has been unlocked by insertion of the earth pin.

MEM Switch, fuse and motor control gear, electric fires and localised lighting equipment

SEND FOR LIST NO. 320 *which gives full details of MEM 13 amp. fused plugs and shuttered socket outlets to BS.1363, with wood and iron boxes. Prices are highly competitive.*

MIDLAND ELECTRIC MANUFACTURING CO. LTD., TYSELEY, BIRMINGHAM 11

Branches in London and Manchester



There's always a call for

BARBOUR'S
FLAX LACING THREAD
for lacing switchboard cables

also
BINDING LINEN THREAD
No. 30/2 Basewaxed to P.O. Specification on 2oz. Cops.

WM. BARBOUR & SONS LTD. LISBURN N. IRELAND

Whatever the instrument

IT NEEDS THE RIGHT CONDUCTOR

—which is, of course, equally true in the electrical sense. The uniform quality of Spencer Wire has led to the enormous extent to which it is used by electrical engineers.

H. C. ELECTROLYTIC COPPER WIRE BARS AND STRIP

SPENCER WIRE

THE SPENCER WIRE CO. LTD., WAKEFIELD, YORKS. TEL.: WAKEFIELD 3671
LONDON OFFICE: 53 VICTORIA STREET, LONDON, S.W.1. TEL.: ABBEY 2562

dm SN 10

A standard for Sub standard accuracy

These instruments are fully guaranteed for accuracy in accordance with the requirements of The Electricity Commissioners, and comply with The Electricity Supply (Meters) Act, 1936. They are available in the following types.

MOUNTED IN PORTABLE POLISHED TEAK CASES

Type FS	—	Single phase, single range.
Type FS	—	Single phase, multi range.
Type FST	—	3 phase, 3 wire, single range.
Type FST4	—	3 phase, 4 wire, single range.

SERVICE OR WALL TYPES MOUNTED IN CAST IRON CASES

Type FS	—	Single phase, single range.

Chamberlain AND Hookham

ROTATING *Sub-standard* **METERS**

CHAMBERLAIN AND HOOKHAM LTD., BIRMINGHAM

ELECTRICITY SUPPLY HANDBOOK

1953

This handbook provides the most comprehensive list published of the principal officers throughout the supply industry in the U.K., together with annual statistics of electricity production and abridged B.E.A. accounts. Maps are included of distribution areas and grid lines. Standard domestic supply tariffs are tabulated and particulars given of consultative councils and associations of the Electrical Industry. An appendix lists the supply voltages in some 5,000 towns and villages.

Price Five Shillings
(plus postage)

Published by

The ELECTRICAL TIMES Ltd · Sardinia House · Sardinia St · London · W.C.2

Telephone : HOLborn 6016

AT FRANKLEY PUMPING STATION

THE CLAERWEN DAM & RESERVOIR

2-410 BHP, 2-340 BHP and 2-170 BHP motors driving Sulzer vertical centrifugal pumps

This installation included H.T. and L.T. switchgear, automatic motor control gear, stepdown transformers and rectifiers for D.C. services, all of ECC manufacture.

The function of the Frankley pumps is to lift a proportion of the water derived by gravitation from the Elan reservoirs and the new Claerwen reservoir to high level service reservoirs in Birmingham after its 73 mile passage through the Elan aqueduct to the raw water storage reservoirs and treatment works at Frankley.

Reproduction by courtesy of City of Birmingham Water Department.
Chief Engineer, Mr. C. A. Risbridger, B.Sc., M. Inst. C.E.

ESTABLISHED 1882

THE ELECTRIC CONSTRUCTION COMPANY LTD.

Head Office and Works
BUSHBURY ENGINEERING WORKS
WOLVERHAMPTON
ENGLAND

TELEGRAMS ELECTRIC WOLVERHAMPTON

TELEPHONE WOLVERHAMPTON 21455 (7 LINES)

Manufacturers of Rotating Electrical Machinery, Switch and Control Gear, Rectifiers and Transformers.

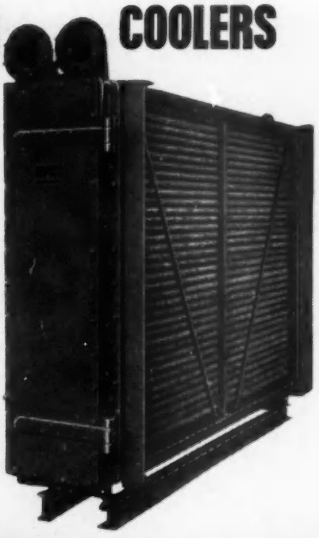
London office: "Bushbury House," 57 Buckingham Gate, London S.W.1
Telephone: VICtoria 3482-3

E

CLOSED CIRCUIT AIR COOLERS

MEAFORD
HULL
LETCHWORTH
DARLINGTON
STOCKPORT
SIEPNEY

Of tubular construction with no connection to the outside atmosphere, these PREMIER Coolers of advanced design have already been installed in many important power stations both in Britain and abroad



by **Premier**

HUDDERSFIELD
JOHANNESBURG
ADELAIDE

THE PREMIER COOLER & ENGINEERING CO. LTD., SHALFORD, near GUILDFORD, SURREY

Announcing the SCALAMP ELECTROSTATIC VOLTMETER

Cat. No. E.T. 11310

This instrument introduces a completely new conception of electrostatic voltmeter. It is compact, portable and robust, and does not require critical levelling or special mounting. The movement has a taut suspension, is critically damped, and readings can be taken with rapidity and ease. Three models are available

Cat. No. E.T. 11308	**1- 5 kV A.C., D.C.**
Cat. No. E.T. 11309	**3-10 kV A.C., D.C.**
Cat. No. E.T. 11310	**5-18 kV D.C. and 5-12 kV A.C., R.M.S.**

DIRECT READING.
ZERO CURRENT DRAIN.
THREE SECONDS PERIOD.
LAMP OPERATES FROM MAINS OR 4-VOLT BATTERY.
BRIGHT SPOT-AND-HAIRLINE INDICATOR.

Please write for our new illustrated catalogue

SCIENTIFIC PYE INSTRUMENTS

Manufacturers of pH Meters, A.F. Oscillators, R.F. Bridges, Precision Variable Condensers, Wave-form Generators, Vacuum Gauges, Galvanometers and Accessories, Precision Switches, Precision Potentiometers Wheatstone Bridges, and Resistance Boxes and Standards.

W. G. PYE & CO. LTD · GRANTA WORKS · CAMBRIDGE · ENGLAND

Absolute reliability
Service . . . . . .
Consistent quality .
Maximum satisfaction

Symbolised by

A.S.C.M. MEMBERS

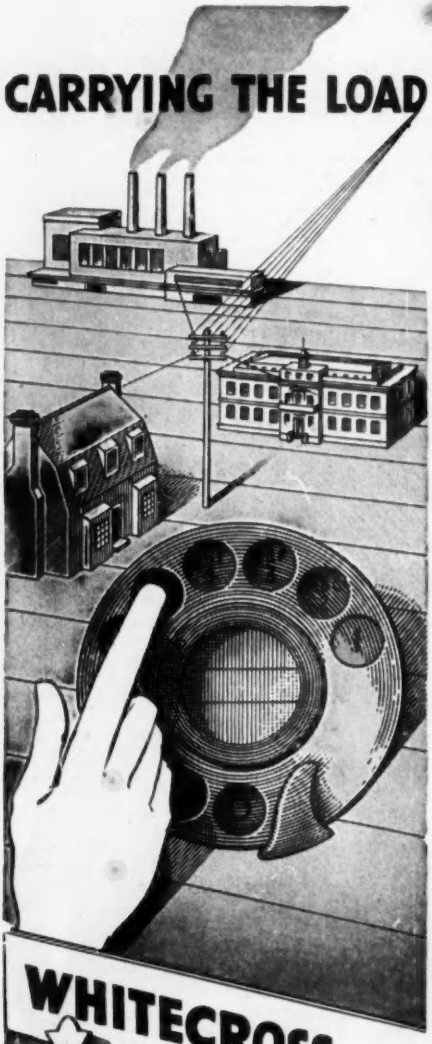
ARE AS FOLLOWS:

ALMA & CRANMORE TUBE CO. LTD.
BARLOW, H. J. & CO. LTD.
ELECTRICAL CONDUITS LTD.
GENERAL ELECTRIC CO. LTD.
GRIFFITHS, ISAAC & SONS
HILDICK & HILDICK
McDOUGALL, JAMES LTD.
METALLIC SEAMLESS TUBE CO. LTD.
MONMORE CONDUITS LTD.
SIMPLEX ELECTRIC CO. LTD.
Comprising:
Credenda Conduits Co. Ltd.
Perfecta Tube Co. Ltd.
Simplex Conduits Ltd.
Stella Conduit Co. Ltd.
STEEL TUBE & CONDUIT CO. (Middlesbrough) LTD.
TALBOT-STEAD TUBE CO. LTD.
WALSALL CONDUITS LTD.

MADE IN ENGLAND
APPROVED & CERTIFIED
A.S.C.M
BRITISH STANDARD

Advertisement of the
ASSOCIATION OF STEEL CONDUIT MANUFACTURERS
96 HAGLEY ROAD · BIRMINGHAM

CARRYING THE LOAD



WHITECROSS

WHITECROSS

conductors

THE WHITECROSS COMPANY LIMITED, WARRINGTON. Established 1864 CVS-67

Selections from our New Catalogue on Conduit and Wiring Accessories.

METWAY PRODUCTS

MOULDED TERMINAL BLOCKS

METWAY

RUBBER GROMMETS

ASK FOR CATALOGUE OHL 31 TE

METWAY

RUBBER BUSHES

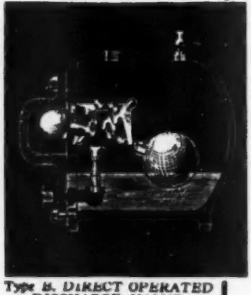
(Please enclose 6d. stamps postage)

METWAY ELECTRICAL INDUSTRIES LTD.

KING STREET, BRIGHTON 1

Phone : Brighton 28366. Grams : Metway, Phone, Brighton

Trap your heat in BRADFORD STEAM TRAPS



Type 8. DIRECT OPERATED DISCHARGE VALVE

Fuel is too expensive to waste. Every thermal unit must be converted into energy. Bradford Steam Traps ensure efficient use of steam and heat. Instantaneous opening and closing action prevents damage to valves and seats. There is a "Bradford" trap to suit all steam pressures. Every trap fully tested and guaranteed.

United States Metallic Packing COMPANY LIMITED

SOHO WORKS, BRADFORD, YORKSHIRE. Telephones: 41294-41295

Branch Offices: LONDON, Liverpool, Bolton, Newcastle, Cardiff, Southampton.

These three fittings are recent additions to the ELECO range of street lighting lanterns and embody all the latest improvements as recommended in B.S. Specification 1788 for lantern construction.

The WELWYN lantern has been re-styled and the refractor springs are totally enclosed to give complete protection against all weather conditions, also giving the interior of the fitting a clean appearance.

The LANCASTER lantern is a controlled cut-off fitting which reduces glare to a minimum. The distribution from the horizontal Mercury discharge lamp in the upper half of the fitting is reflected by means of specially designed reflectors through the scientifically designed refractor bowl giving high and even illumination on the road surface.

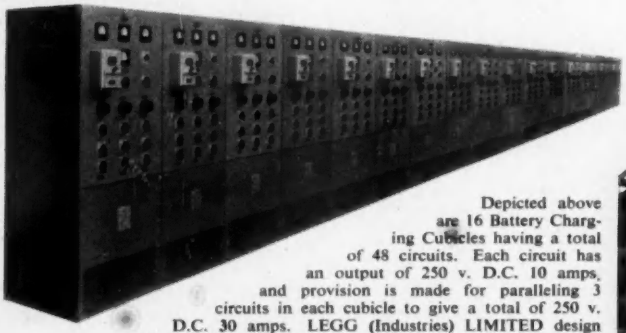
The GOLDEN RAY MARK III lantern is completely dustproof and is available for all sizes of sodium discharge lamps. The "Perspex" refractor plates have machined "Perspex" prisms sealed by a special process to the interior of the outer enclosing "Perspex" bowl and because of the unique dustproof qualities of this fitting, maintenance costs are reduced to a minimum.

Engineering and Lighting Equipment Co. Ltd.

SPHERE WORKS, ST. ALBANS, HERTS

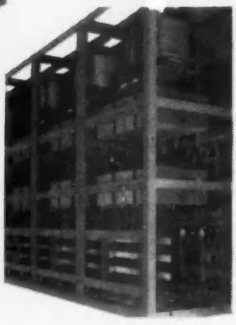
Telegrams: VOLTARCON, ST. ALBANS ELECO *Telephone*: ST. ALBANS 2258/2259

16 BATTERY CHARGING CUBICLES



Depicted above are 16 Battery Charging Cubicles having a total of 48 circuits. Each circuit has an output of 250 v. D.C. 10 amps, and provision is made for paralleling 3 circuits in each cubicle to give a total of 250 v. D.C. 30 amps. LEGG (Industries) LIMITED design and manufacture equipment incorporating metal rectification for all purposes where a D.C. Supply is required from an A.C. source, also Transformers, Air Cooled and Oil Immersed, up to 150 KVA capacity.

This panel has been specially designed and manufactured for an overseas customer.



A section of the rear view of 3 typical cubicles.

Legg (INDUSTRIES) LTD - WILLIAMSON ST - WOLVERHAMPTON

MINERVA
ELECTRICAL INSULATING VARNISHES

STOVING VARNISHES (Natural Resin Type)
STOVING VARNISHES (Synthetic Resin Type)
THERMO-SETTING VARNISHES
AIR-DRYING VARNISHES
CLOTH VARNISHES
CORE-PLATE VARNISHES (Stoving and Air-Drying)
COPPER-WIRE ENAMELS (Oleo-resinous and Synthetic Types)
All the above are supplied in black & clear

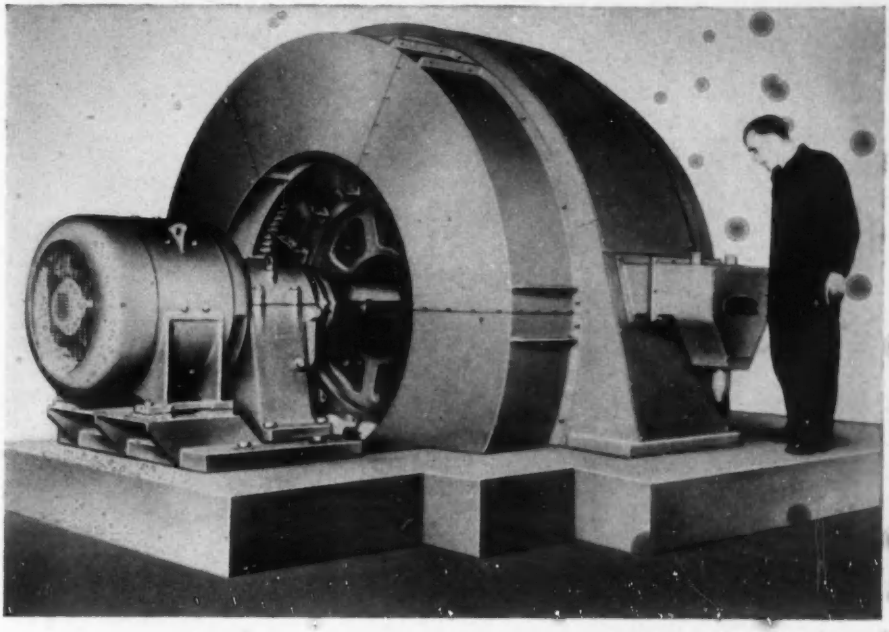
ACID & HEAT RESISTING ENAMELS
Available in all colours
MICA BONDING VARNISHES
COIL STICKING VARNISHES
SLEEVING VARNISHES (Black, Clear and Colours)
CABLE LACQUERS (Non-flam., Cellulose Type and P.V.C.)
COMPOUNDS Various types

All the materials listed conform to B.S. Specifications wherever applicable

Our Insulating Varnish Department includes research and testing laboratories: the service of specialists is available to any manufacturer or engineer concerned with problems of insulating materials and their application.

PINCHIN JOHNSON & CO.

4 CARLTON GARDENS, LONDON, S.W.1 Telephone: TRAfalgar 5600



For efficient power generation

Brush Alternators embody the results of the extensive experience which the Company has built up during the past seventy years in the design and manufacture of Electrical Rotating Machinery, and complete Generating Plant for large Power Stations.

The machine illustrated, which embodies robust fabricated construction, has an output of 2,500 kVA—11,000 volts at 428 r.p.m., and is one of a number of Brush Alternators built for the Isle of Man Power Station.

We are in a position to offer quick delivery of a range of our large Alternators and also synchronous Motors, full details of which will be sent on request.

Our full range covers outputs of 3 to 3,000 kVA.

Alternators by BRUSH

THE BRUSH ELECTRICAL ENGINEERING CO., LTD., LOUGHBOROUGH, ENGLAND

Birmingham · Bristol · Cardiff · Glasgow · Leeds · London · Manchester · Newcastle · Sheffield

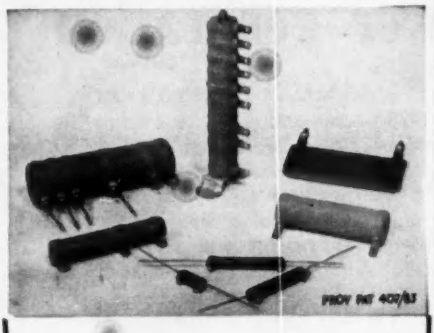
a.13

Insulated WIRES & CABLES

LPS

INSTRUMENT WIRES · STRANDS & BRAIDS
TELEPHONE & RADIO CORDS & CABLES
RESISTANCE WIRES · P.V.C. TUBINGS

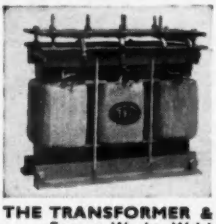
L.P.S. ELECTRICAL CO. LTD
ALPERTON · WEMBLEY · MIDDLESEX
TELEPHONE: PERIVALE 5621-2 · TELEGRAMS: ENGINEYOR, PHONE, LONDON



May we quote you for Wire-Wound Resistors, Vitreous Enamel or Cement Coated, Low Tolerances Competitive prices, Good deliveries.

ELECTRICAL DEVICES Co. LTD
MARSH ROAD, BASILDON, PITSEA, ESSEX
TEL: VANGE 2167

POWER Transformers



10 VA to 100 kVA Open, Enclosed, Oil Cooled, D.W. and Auto

For Industrial Engineering, Furnaces, Electronics, Phase Conversion, etc.

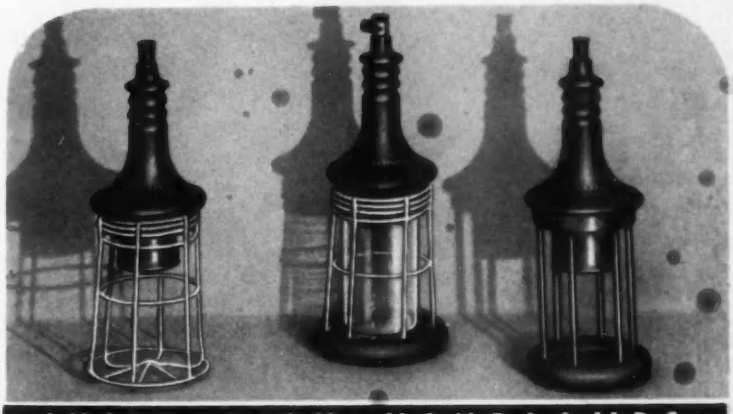
THE TRANSFORMER & ELECTRICAL CO. LTD.
Eastern Works, Walthamstow, London, E.17
Phone KEYstone 5031/2

ARTHUR BRIDGENS LTD.
BROWN STREET
SHEFFIELD 1

H. C. COPPER CASTINGS

Phone: Sheffield 21477
Tel.: "Arbridge," Sheffield

ELECTRICAL NETTLE ACCESSORIES



INSPECTION HANDLAMPS

The range of Inspection Handlamps shown above is selected from our Catalogue, which contains over 200 types of accessories which we manufacture. A copy of this or a descriptive leaflet of the above range together with our current price list will be sent on request.

Write now for details:

NETTLE ACCESSORIES *Ltd* HARPER ROAD WYTHENSHAWE MANCHESTER

MOULDED BAYONET HOLDERS

by Sperryn TRADE MARK

A complete range of Batten, C.T.S., Skirted, Conduit, Switch and Flexible lampholders are available complying with B.S.52

Please write for Catalogue No. E 253

for Efficient Electrical Accessories of Quality

"Specify Sperryn"

SPERRYN & CO. LTD., MOORSOM STREET, BIRMINGHAM 6

LONDON OFFICE:
21-23 GREAT SUFFOLK STREET, S.E.

FIRE! *QUICK!*
DEADLY SERIOUS BUT FOR
NU-SWIFT!

"The Police advised us to keep clear until the Fire Brigade arrived but, recharging Nu-Swift four times, I saved our home and business. 'What a wonderful job', said the Fire Brigade."

NU-SWIFT LTD · ELLAND · YORKS

In Every Ship of the Royal Navy

SWITCHGEAR SPECIALISTS

STATTER

J. G. Statter & Co. Ltd., 82 Victoria Street, S.W.1

The SCEMCO 5ft RED SPOT BATTEN

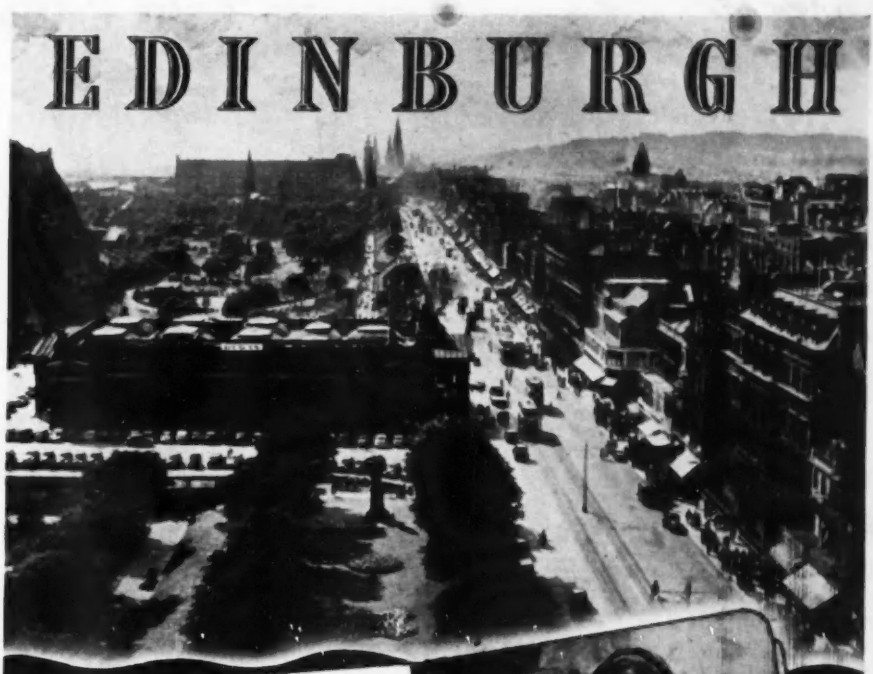
NOW 87/6 LESS LAMP SUBJECT

ALL COMPONENTS COVERED BY SCEMCO FREE REPLACEMENT GUARANTEE.

NO GREATER FLUORESCENT VALUE AT ANY PRICE!

DETAILS: SCEMCO LIMITED, SOHO ST., LONDON, W.1 **GER 1461-2-3**

EDINBURGH



Edinburgh.

Making a 33kV. 3-Core Joint on Cable supplied to the South East Scotland Electricity Board for the development of 33kV. Ring Mains throughout Edinburgh

SCOTTISH CABLES LIMITED

DEANSIDE • RENFREW • SCOTLAND

LONDON OFFICE • BUSH HOUSE • ALDWYCH, W.C.2

Associated Company: SCOTTISH CABLES (SOUTH AFRICA) LTD. PIETERMARITZBURG, NATAL

Write or Phone for OUR 1953 CATALOGUE

48 pages illustrated of Electric Fires, Tubular Heaters, Kettles, Irons, Washing Machines, Refrigerators, Immersion Heaters and Circulaters, Cookers, Clocks, Vacuum Cleaners and Floor Polishers, etc.

E·W·F ELECTRICAL WHOLESALERS FEDERATION MEMBER

DRAKE & GORHAM WHOLESALE LTD.

WHOLESALE AND MANUFACTURING ELECTRICAL ENGINEERS

77 LONG ACRE, LONDON, W.C.2

Tel: TEM 3993

and Branches:

MANCHESTER: 53 Sackville St., Manchester 1.	CEN 7866
BRIGHTON: 80a Queen's Road - -	21894
GLASGOW: 182 St. Vincent Street -	CITY 6411
BRISTOL: 2 and 4 Church Street, Temple	23509
DUBLIN: 2 Church Lane, College Green	78672

EDGES, TOO, RUBBER COVERED

THE extreme edges of this clip are rubber protected, thus fully shrouding the clip eliminating metal to metal contact and absorbing vibration. Available in a range of sizes from ¼ in to 2½ in. nominal pipe diameter. A plain type clip or an electrical earthing type is offered. In full circular or saddle type. Fully descriptive leaflet is available from Dept. E.

CLATONRITE PATENTED ANTI-VIBRO CLIP

HOWARD CLAYTON-WRIGHT LTD.

WELLESBOURNE WARWICKSHIRE

Telephone: Wellesbourne 316-7-8 Telegrams: Clatonrite Wellesbourne

Service & ENTERPRISE 6222

AUCHTERLONIE

BALL BEARINGS
ROLLER BEARINGS
PLUMMER BLOCKS, etc.

Immediate Delivery

Keen Prices. Write for monthly stock list A.1

CHAS. AUCHTERLONIE & CO. LTD.

32 STATION RD., NEW SOUTHGATE, LONDON, N.11

RATCHET & REVOLUTION COUNTERS

PLEASE SEND FOR LEAFLET No. 18/7

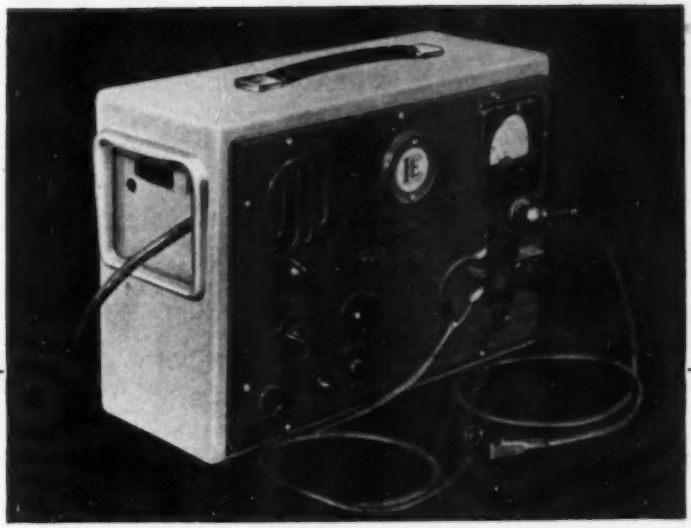
Speeds up to 6,000 r.p.m.

SOLE MAKERS AND PATENTEES:—

B. & F. CARTER & CO. LTD.

BOLTON, 9

For industrial electrical testing



British Instruments Industries Exhibition. See demonstration on Stand No. 9, Olympia

THE 'ENGLISH ELECTRIC' electronic insulation tester provides for the first time 10 kV D.C. in a truly portable equipment having the following outstanding features:

- Non-lethal output adjustable from 500 to 10,000 volts.
- Measurement up to 250,000 megohms.
- High accuracy on comparative tests.
- Rejection of surface leakage current.
- Aural indication of ionisation.

Price : £60. Size : 15" x 10" x 6" Weight : 23 lbs

'ENGLISH ELECTRIC'
electronic insulation tester

THE ENGLISH ELECTRIC COMPANY LTD. QUEENS HOUSE, Kingsway, London, W.C.2

Industrial Electronics Department E., Stafford

WORKS: STAFFORD • PRESTON • RUGBY • BRADFORD • LIVERPOOL • ACCRINGTON

EIN. 1

See the English Electric advertisement for Industrial Motors which appears on page 37 of this issue.

In thirty years and more we have designed and made a lot of springs—good springs from the best materials available. Now we feel we really have springs at our finger-tips, and there isn't much we don't know about them. Don't you think all that experience would be useful to you?

Estab. 1919. *A.I.D. approved.*

Manufacturers of Wiremen's Tapes in 30, 60 and 100 ft. lengths. At present available from stock.

LEAVE IT TO Lewis OF REDDITCH

THE LEWIS SPRING CO. LTD., RESILIENT WORKS, REDDITCH
Telephone: Redditch 720/1/2
London Office: 321 High Holborn, W.C.1 Telephone: Holborn 7479 and 7470

KEY

FIBRE CONDUIT
FOR UNDERGROUND CABLES
EXTREMELY EASY TO LAY, NO PROJECTION AT JOINTS, LONG LENGTHS, FEW JOINTS, PERFECT ALIGNMENT.

EXPORT
Write for names of Overseas Agents.

Write for details and specifications.

THE KEY ENGINEERING CO., LTD.
4, Queen Victoria Street, London, E.C.4. Telephone: City 1185/6
and
Trafford Park, Manchester. Tel.: Trafford Park 1903

ARROW
MOTOR CONTROL GEAR
The *design* you'll choose

WILLIAM GEIPEL LTD.,
156-170 BERMONDSEY ST., S.E.1
FOUNDED IN LONDON 1871

British Instrument Industries Exhibition, 1953

Olympia

June 30th to July 11th, 1953

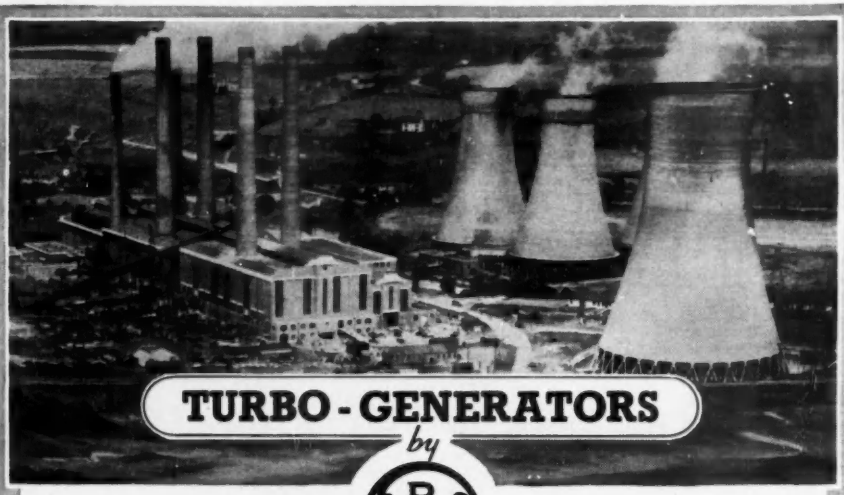
Everett Edgcumbe & Co. Ltd.
extend a cordial invitation
to their friends to visit
their Stand No. **G 9**
at the above Exhibition
— 10 a.m. to 6.30 p.m.

EVERETT EDGCUMBE

Makers of Electrical Instruments for Indicating, Recording and Controlling: Photometric Apparatus : Process Controls.

COLINDALE WORKS, LONDON, N.W.9

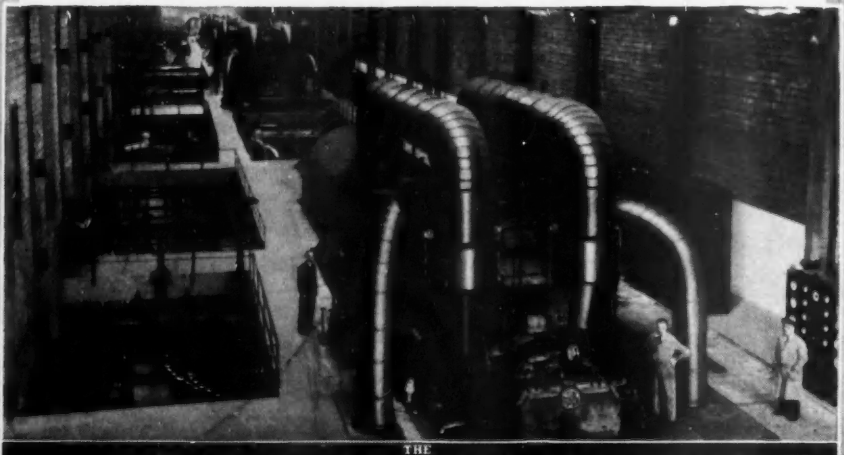
DHB



TURBO-GENERATORS
by
B
T-H

Power-stations throughout the world are equipped with steam turbines and generators made by BTH, who hold a leading position as designers and manufacturers of some of the largest machines installed - or building.

At the Kearsley Station of the British Electricity Authority seven BTH turbo-alternators, ranging in size from 535 kVA., (emergency set) to 75,000 kVA., will provide a generating capacity of 394,293 kVA.

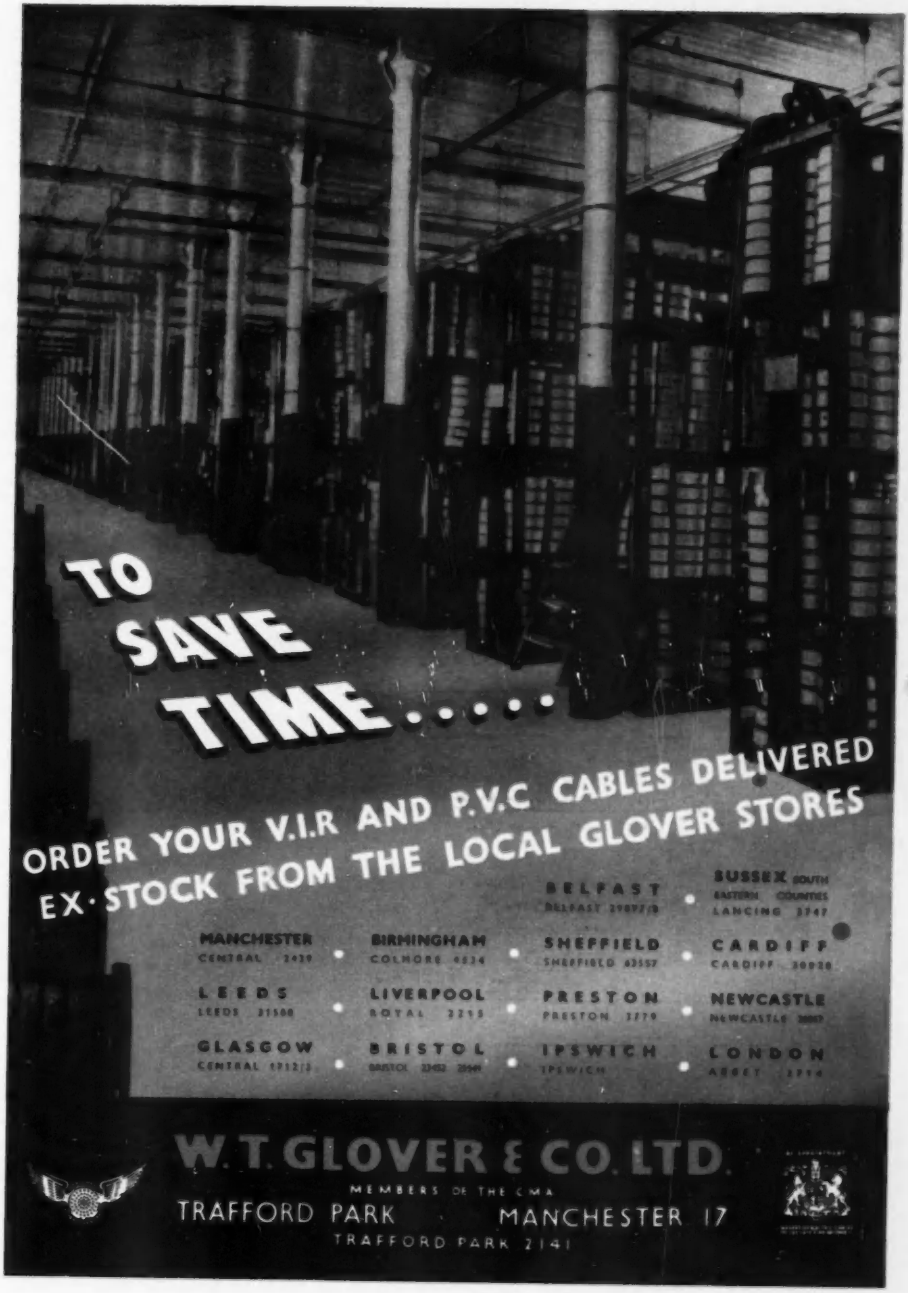


THE
BRITISH THOMSON-HOUSTON
COMPANY LIMITED, RUGBY, ENGLAND

Member of the AEI group of companies

A4849

Printed in England for the Proprietors, THE ELECTRICAL TIMES, LTD., by SUN PRINTERS, LTD., London and Watford, Herts, and published at Sardinia House, Sardinia Street, London W.C.2. June 25, 1953


TO SAVE TIME.....
ORDER YOUR V.I.R AND P.V.C CABLES DELIVERED EX-STOCK FROM THE LOCAL GLOVER STORES
BELFAST
BELFAST 29877/8
SUSSEX SOUTH EASTERN COUNTIES LANCING 3747
MANCHESTER CENTRAL 2439
BIRMINGHAM COLMORE 4624
SHEFFIELD SHEFFIELD 63557
CARDIFF CARDIFF 30028
LEEDS LEEDS 21500
LIVERPOOL ROYAL 2215
PRESTON PRESTON 3279
NEWCASTLE NEWCASTLE 30057
GLASGOW CENTRAL 1212/3
BRISTOL BRISTOL 23452 2049
IPSWICH IPSWICH
LONDON ABBEY 3214
W. T. GLOVER & CO. LTD.
MEMBERS OF THE C.M.A.
TRAFFORD PARK MANCHESTER 17
TRAFFORD PARK 2141

ELECTRICAL TIMES

DORMA

TS FUSED SWITCH

UP TO 300 AMP. A.C. OR D.C.

- Butt, silver faced contacts
- Quick double break action
- Shock tested mechanism
- Easy wiring
- HRC or rewireable fuses
- Space-saving design

Write for booklet TSS/1

DORMAN & SMITH LTD.
MANCHESTER 5

TRY GILFL

FOR THE

—the troublesome instal works, brewery, farm subject to abnormal co atmospheres.

Reliability in such c its suitability for t

GILFLEX C
41 THE PARADE • HIGH
WAT

n

D
H
.C.

D.

LEX CONDUIT

UNUSUAL JOB

nstallation in the tannery, chemical
rm buildings — in fact, anywhere
conditions or chemically activated
Put it underground, too.

h cases will convince you of
r the ordinary installation

CONDUITS LTD.
IGH STREET, WATFORD • HERTS
WATFORD 3422